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The BULLETIN

American Society of Hospital Pharmacists

Cation Exchange Resins

in clinical medicine

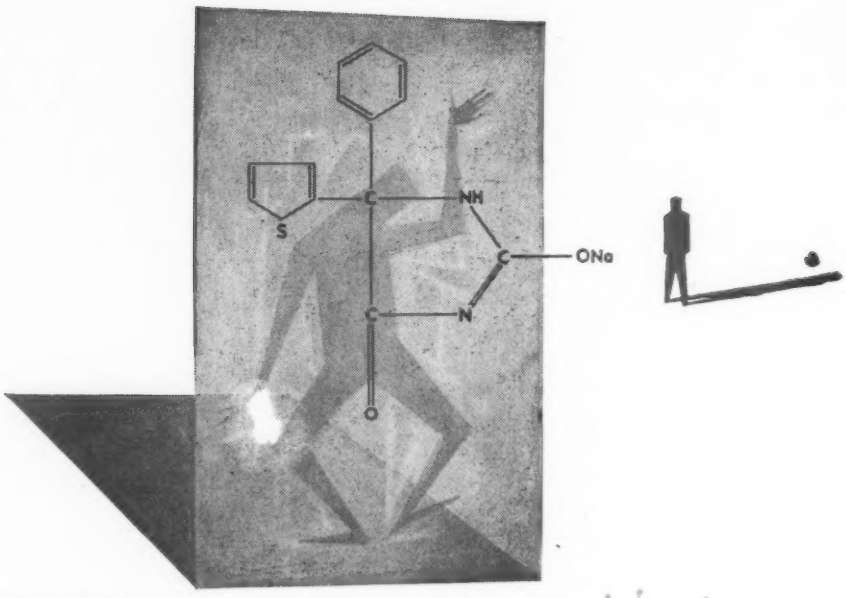
Suggested Equipment Lists

for 50, 100 and 200 bed general hospitals

Seventh Institute

on hospital pharmacy

VOLUME 8 NUMBER 2 MARCH-APRIL 1951



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The BULLETIN

American Society of Hospital Pharmacists

MARCH-APRIL 1951
VOLUME 8 NUMBER 2

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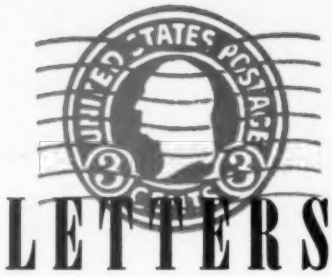

LETTERS

Appreciation

DEAR SIRS: I am returning the formularies which you so generously loaned me from the A.Ph.A. library. I certainly appreciated the extended time and your kindness in making them available to us. These are excellent references which will help me in making definite plans for establishing a formulary in our hospital.

SISTER M. CHERUBIM, O.S.F., *pharmacist*
St. Elizabeth Hospital
Danville, Illinois

Interested in Publications

DEAR SIRS: I am writing to ask if you would be good enough to send me a sample copy of the *Journals of the American Pharmaceutical Association,* both the Practical and Scientific Editions. I have heard and read much about the merits of these two publications but have never seen them.

Also, may I have information as to how one may join the American Society of Hospital Pharmacists? I am a subscriber to THE BULLETIN and could not get along without it.

I might add that I am a member of the Canadian Society of Hospital Pharmacists.

SISTER M. ROSE AGNES, *pharmacist*
St. Joseph's Hospital
Saint John, N. B., Canada

Capsule Filling Machine

DEAR SIRS: Request information regarding a capsule filling machine suitable for a hospital pharmacy. We are desirous of procuring a machine capable of filling about 100 capsules at one time.

SAMUEL SARNER, MSC, *pharmacy officer*
Tripler Army Hospital
APO 438, San Francisco, Calif.

EDITOR'S NOTE: *A capsule machine of the type you described is available from the Del-Tay Manufacturing and Engineering Company, 3201 Fallscliff Road, Baltimore, Md. We are enclosing a tear sheet from the March-April (1949) issue of* THE BULLETIN *which describes this machine.*

From England

DEAR SIRS: I was very interested to read in *The Indian Pharmacist* for October, 1950, an article on Propylene Glycol which was reprinted from THE BULLETIN OF THE AMERICAN SOCIETY OF HOSPITAL PHARMACISTS (Jan.-Feb.) 1950. As an English hospital pharmacist, I should be most grateful if you could obtain a reprint of the article for me.

AUBREY D. M. DAVIES, *pharmacist*
University College Hospital
London, England

Interest in Minimum Standard

DEAR SIRS: Kindly send one copy of your recently prepared Minimum Standard For Pharmacies in Hospitals as mentioned in the *J. Am. Med. Assoc.,* Feb. 24, 1951, page 565.

ERNEST BRUCH, M.D., *chairman*
Pharmacy Committee
St. Anthony Hospital
Rockford, Ill.

DEAR SIRS: We would greatly appreciate receiving five or six copies of the Minimum Standard for Pharmacies in Hospitals as mentioned in the *J. Am. Med. Assoc.,* Feb. 24, 1951, page 565.

The bed capacity in our hospital is 200. Our pharmacy is already organized but we are desirous of extending and improving the work in the existing department.

DOROTHY E. BREHANY, *pharmacist*
Riverside Hospital
Toledo 11, Ohio

Accepts New Position

DEAR SIRS: I wish to thank you for your many efforts to find a suitable vacancy for me. About ten days ago I accepted the position as chief pharmacist at Elkhart General Hospital, Elkhart, Indiana.

Please forward all A.Ph.A. publications as well as THE BULLETIN to the new address.

SYDNEY NOBE, *chief pharmacist*
Elkhart General Hospital
Elkhart, Indiana

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EDITORIAL

Our Opportunities for Increased Professionalism

by Don E. Francke

Hospital pharmacists have a special opportunity for increased professionalism. Several circumstances make this true. First, because of the nature of our practice, we can apply the knowledge and skills for which we were educated. This we can do on a full time basis unencumbered by the necessity for extraprofessional activities in our professional day. Second, our environment in an institution devoted to the care of the sick makes it possible for us to easily maintain the concept of public service. Third, our close contact with the medical and allied staffs gives us the opportunity to render our special professional services and to counsel the medical care team without being influenced by personal pecuniary gain. Because of these special opportunities, we have a high responsibility to reflect our profession at its best.

But what is a profession and what makes a man or woman professional? The age old distinction between a trade and a profession is that a trade is conducted for profit while a profession is organized for public service. The hallmark of a profession is that its members minister to the people. Basically, the prime responsibility for the professional stature of hospital pharmacy rests with each of us. We cannot ignore it; we cannot delegate it; nor can we relegate it to a secondary consideration. The professional stature of hospital pharmacists as a group is the total of the professional statures of each of us. Professionalism is as much a matter of spirit as it is of practice. Mere technical training and competency does not make a profession; it makes a vocation. Should we forget our prime responsibility to the public health, which is our basis for licensure, we would become as tradesmen and lose our professional standing. We maintain our professionalism as long as we keep these precepts to the fore and practice them. The professional spirit of hospital pharmacists is nurtured by the ASHP, and the keystone to any success the Society may have is the keen interest, enthusiasm, hard work, and cooperation that is so evident in the activities of our local chapters. Strong local chapters make a potent national organization and help to permeate the spirit of service to the public health to all who practice pharmacy in hospitals.

Another characteristic of a professional individual is his keen interest in the welfare and future of his profession. He knows that his profession must advance through organizations. He recognizes that an organization without members is a sham. He understands that his membership is a badge of professionalism even though circumstances may not permit him to engage in many of the activities of his organization. One of the wonderful characteristics of ASHP members is the splendid spirit with which they wear this badge of membership and their eager desire to build a stronger and better Society. They know full well that the general practice of hospital pharmacy can reach new heights only when we have a large proportion of the nation's hospital pharmacists as active, interested members who will carry the program of the Society for better pharmaceutical service to each hospital. For example, the success of our Society's future program for minimum standards for hospital pharmacies is going to be dependent principally upon the interest and upon the willingness to plan and work on the part of each individual hospital pharmacist. No member can contribute more to his profession than by enlisting new people in the work the Society is doing. A bigger ASHP makes a stronger ASHP. The stronger the ASHP, the higher will the general level of hospital pharmacy practice be raised.

In addition, a professional individual is one who understands the theory underlying the practice of his specialty. He is thus differentiated from a technician who carries out routine manipulative procedures without understanding their underlying principles. A professional man understands that his education is never finished and that he must constantly bring his basic knowledge up to date through the reading of his professional journals, his attendance at refresher courses, and his participation in local and national meetings. Recognizing these facts, the Society has established its publication, has fostered annual Institutes or Refresher Courses in hospital pharmacy, and encourages the formation and growth of affiliated chapters.

Hospital pharmacists throughout the nation have built a firm foundation for increased professional growth. But someone once said, "'The secret of success is the persistency of purpose". Let us be persistent and continue to press toward our goals. And let us remember that the key to our success will be the deeds of each individual who makes up our specialty. It is each of you who reflect hospital pharmacy in your hospital, to your medical staff, to the public, and to your fellow pharmacists.

It is probable that exchange resin therapy will come to occupy a distinct place in clinical medicine

the use of CATION EXCHANGE RESINS in clinical medicine

by SIBLEY W. HOOBLER

HISTORICAL

Although certain naturally occurring sands, sulfonated peat, lignite and coal have been used to soften water for years and although "terra sigillata" was used in medieval times to protect against poison plots, the modern development of ion exchange resins may be said to start with the work of Adams and Holmes[1] who synthesized phenol-formaldehyde resins capable of cation exchange, and of Dock[2] who first suggested their clinical use. Applications of these substances in analytical chemistry have been numerous: in the removal and concentration of cations from solutions in which they are too dilute for analysis by ordinary methods; in chromatographic columns to separate ions having similar properties; in removal of traces of interfering cations; in the recovery of valuable analytical reagents; and in many other ways[3]. Aqueous solutions may be dealkalinized by passing them through a cation exchange resin and a combination of cation and anion resin will remove salts from aqueous solutions almost as effectively and with greater ease than distillation. The many industrial uses of such techniques are obvious.

With recognition of the value of low sodium diets in the treatment of edema, attempts were made to improve the efficiency of low sodium management by the administration of cation exchange resins. Although anion exchange resins have been used to decrease gastric acidity and for other purposes, the present review will apply only to the use of cation exchangers. New drug applications for some of these substances have been made effective by the Federal Food and Drug Administration and a number of pharmaceutical companies are expected to offer them for sale in the near future.

SIBLEY W. HOOBLER, SC.D., M.D., is assistant professor of Internal Medicine in charge of the Cardiovascular Unit at the University of Michigan.

CHEMICAL CONSIDERATIONS

Cation exchange resins consist of insoluble long-chain cross-linked polymers with large numbers of free acid groups able, under favorable circumstances, to exchange H^+ ion with cations in solution. A type reaction may be expressed as follows:

$$\text{(I)}\quad R\text{—}H + Na^+ + Cl^- \rightleftarrows R\text{—}Na + H^+ + Cl^-$$

The insoluble resin, by binding Na^+, effectively removes it from solution, and releases hydrogen ion in its place. The reaction may be reversed by reducing cation and increasing hydrogen ion concentration as, for example, by exposing the sodium form of the resin to solutions of strong acid.

Resins are described by the type of ion available for exchange, (e.g. "'hydrogen exchanger", "acid or H- resin", "potassium resin", etc.), and by the acid grouping responsible for cation binding (e.g., "carboxylic" or "sulfonic acid resin"). The release of hydrogen ion is termed the "hydrogen cycle", and the cation available for exchange per gram of resin is described as the "capacity" of the resin. When exchange under any set of circumstances is complete the resin is said to be "exhausted".

It is obvious from equation I that the hydrogen ion concentration of the solution affects the ability of the H- resin to take up cation. Thus, at high *p*H values the resin will exist largely in combina-

tion with cation, while at low *p*H values, as in the stomach, the H- form of the resin will predominate. The degree of conversion at any *p*H level will depend on the acid grouping contained in the resin and titration curves may be constructed which depend to a large extent on the strength of the R-H binding. Typical curves to represent the combination of potassium with a strong acid resin (sulfonic type) and a weak acid resin (carboxylic type) are presented in Fig. 1. It will be seen that the conversion of the sulfonic acid resin to K resin occurs rapidly as *p*H rises and is virtually complete at *p*H 6, while the carboxylic acid resin accepts cation over the range from *p*H 3 to *p*H 12. These considerations are of prime importance in the clinical use of these substances since wide variations in *p*H are likely to be encountered in the gastro-intestinal tract, and these affect the capacity of various resins to absorb Na+. Futhermore, the liberation of H+ in the process of ion exchange tends to alter the *p*H of the solution and in this sense resins act chemically as buffers and may significantly alter the *p*H of physiological fluids.

The capacity of a resin depends upon the number and binding power of its surface ions. It may be considered as an "ionic solid" in which a large, highly cross-linked, non-diffusible and multivalent anion is electrically balanced by a large number of small, diffusible surface ions of opposite charge. (Fig. 2)

The *capacity* of the resin depends on the number of negative charges per gram of resin, and the ease with which it exchanges one ion for another is dependent on the strength of attractive forces between negative anion molecule and positive surface ions, and the degree of dispersion of the resin particles. The earliest resins contained many internal cross-links per unit of electrical charge and had low capacities; recently synthesized ion exchangers have a high ratio of electrical charge to internal weight and thus are most efficient exchangers. Since the bulk of resins is of appreciable clinical consequence, the capacity of an exchange resin is an important consideration in assessing its clinical usefulness (Table I). The strength of the bond between the surface and internal charge is weakest with strong acid resins (sulfonic) and hence exchange takes place at lower hydrogen ion concentrations and is completed more rapidly. Carboxylic acid resins have stronger surface bonds and convert to cation resin more slowly. For this reason they are to be preferred if exchange is desired in the more alkaline solutions of the duodenum and ileum.

It is important to remember that no resin has any selective affinity for a particular cation. When an H- resin is placed in contact with many different cations, as in physiological situations, exchange with a particular cation depends on its relative concentration, and on its electric charge and mass as determined by valence and atomic number. Equivalent concentrations of certain physiologic cations would be absorbed in the following order:

$$Ca^{++} > Mg^{++} > K^{+} > NH_4^{+} > Na^{+}$$

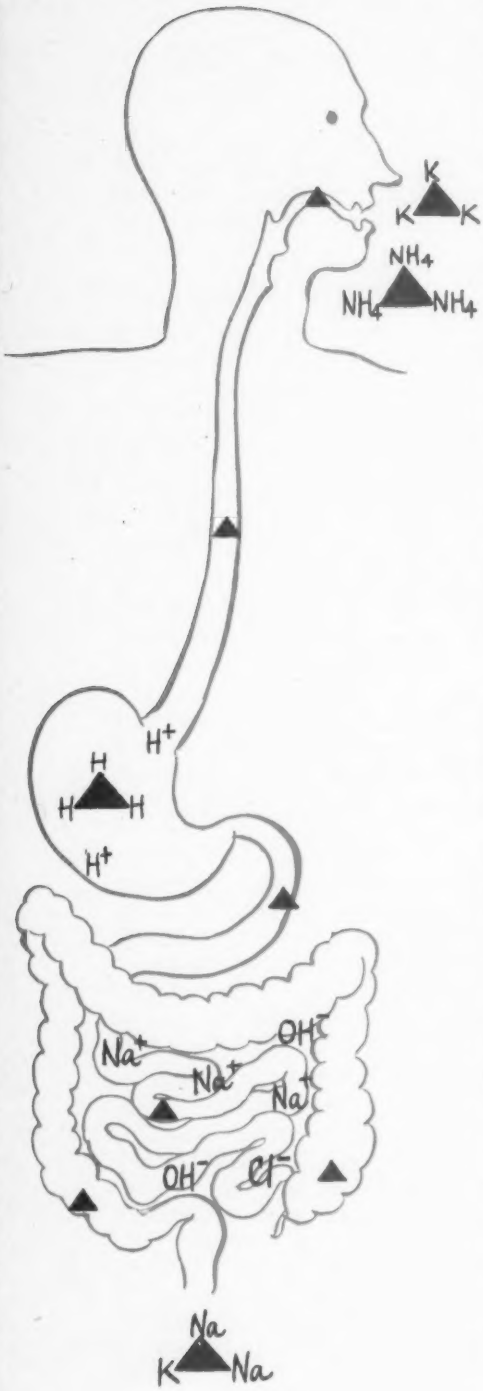
It is thus apparent that sodium is taken up by resin by virtue of its high concentration in most body fluids, and not on the basis of its chemical characteristics.

PHYSIOLOGICAL CONSIDERATIONS

The prinicpal objective of administering cation exchange resins is to prevent the absorption of dietary sodium or to extract it from gastrointestinal secretions, thus accomplishing sodium depletion in edematous states. Since gastrointestinal secretions contain large amounts of Na+ and the resin is insoluble, it was thought that this ion would combine with resin in the gut and be removed in the feces.

A carboxylic acid resin given orally will remove 1 m.eq. (23 mg.) of sodium per gram of resin on a sodium intake exceeding 1.5 Gm. daily, and 0.25 to 0.35 m.eq. (6-8 mg.) or less per gram on a 200 milligram sodium diet.[4] Fed at the usual level of 60 grams per day, this would mean that the resin would absorb about 1.5 grams of sodium daily on a liberal salt allowance. Since the average American dietary contains 2-6 grams of sodium daily, salt depletion could not be accomplished on this regimen. If the patient were restricted to 1.5 grams of sodium daily (the usual diet contains this amount of sodium when no salt is added in food or cooking and salty meats and canned goods are avoided) he might achieve a slightly negative sodium balance. If sodium intake were reduced to the 200 milligram level and 60 grams of resin were given, a theoretically negative daily balance of about 250 mg. would be achieved if no allowance is made for renal excretion of Na+. Such a negative balance has been produced in animals using sulfonic acid resins,[5] although opinion differs as to whether it can be achieved in the human subject.

Dock points out[6] that if resin were to exchange with enteric juice which is in free equilibrium with body fluids, larger quantities of sodium would be withdrawn on a low sodium intake. He postulates that equilibrium must be reached in the stomach or upper duodenum to account for the low *in vivo* capacity of exchange resins and their



marked dependence on dietary intake. An enteric-coated exchanger appeared to have increased efficiency, thus tending to confirm his opinion. It is possible that resin, intimately mixed with lipids and other digestion products, as it leaves the stomach, loses part of its ability to exchange as it reaches the less acid region of the gut.

Potassium is removed to the same extent as sodium *in vivo* when patients are on diets exceeding 1 gram of sodium per day. When the diet contains less than 0.5 gram of sodium, as much as 1.5 m.eq. of potassium may be removed per gram of resin.[6] These observations reflect the greater affinity of potassium compared to sodium for exchange resins, and suggest the danger of creating potassium deficiency. This may be prevented by giving potassium forms of the resin in combination with acid or ammonium forms. In the acid environment of the stomach and upper duodenum, K^+ and NH_4^+ are liberated and absorbed rapidly, so that the net effect is the same as administering potassium and ammonium salts at the same time as the resin. In the lower small intestine, as the *p*H rises, the H- form of the resin is converted partially to Na^+ and K^+ resins and the cation is finally removed in the feces.

Calcium and magnesium are removed to a lesser extent *in vivo* than might be predicted. Fecal calcium is not greatly increased, presumably since much of the dietary calcium is present as the weakly ionized oxalate or phytate,[8] or in other insoluble forms in the lower bowel as soaps, phosphates, etc. Low calcium tetany has been reported, however, and the possibility of skeletal demineralization must be considered.[6]

The possibilities of other deficiencies, such as in iron, manganese, thiamin, riboflavin and amino acids, must be considered but have not yet been clinically noted. Failure of stool nitrogen to increase does not suggest that many amino acid residues are carried out in the feces,[8] although *in vitro* resins have considerable capacity for these substances.

Common to all H— ion exchangers is the production of acidosis. Since one equivalent of H^+ is released for every equivalent of cation which is bound, the net effect is to release acid into the gut. Absorption of this acid requires physiological adaptations of which the most prominent is urinary excretion of the acid anion together with ammonium formed by the kidney. Cl^- levels in plasma and body fluids may increase slightly and, since less sodium is absorbed, total base is ultimately reduced with a decline in CO_2 combining power. Such an acidosis may become excessive in the presence of renal damage and failure to produce ammonia. It will be observed that these changes resemble those induced by long term administration of acid salts such as ammonium or calcium chloride, and that they are an inevitable sequel to the successful removal of base by the cation exchange resin. Acidosis may be partially prevented by potassium resins but *not* by ammonium resins since absorbed NH_4^+ is converted to urea and is not made available to the kidneys for neutralization of absorbed anions.

The possibility of removing acid anions at the same time cation is absorbed was suggested by Dock[2] and has been studied clinically by Kohlstaedt and his coworkers.[9] One patient who developed acidosis on the acid plus potassium resin was free of such a complication when anion exchanger was also added. The efficiency of sodium removal was increased at the same time.

CLINICAL INDICATIONS

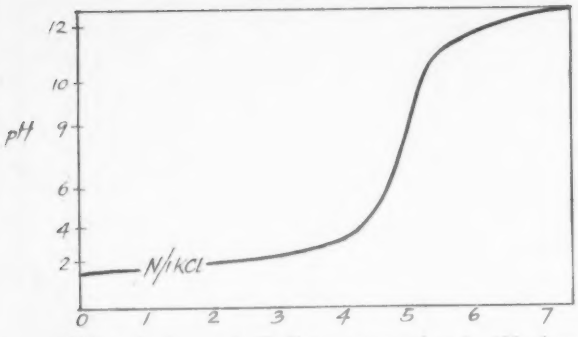
Cation exchange resins would seem particularly useful in the management of edema (1) when mercury diuretics are contraindicated or ineffective, (2) to avoid the repeated use of mercury diuretics when low sodium diets fail to prevent edema and (3) when it

TABLE 1. NAMES AND CHARACTERISTICS OF SOME COMMERCIAL CATION EXCHANGE RESINS

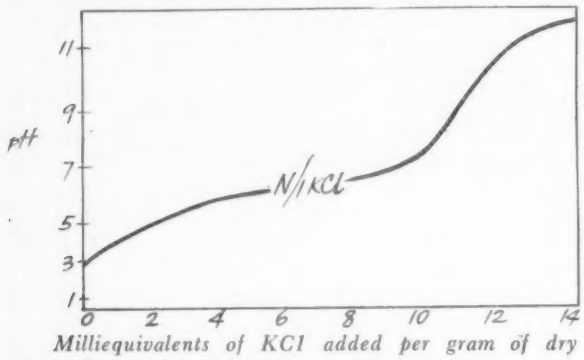
NAME	SYNONYM	MANUFACTURER	*In Vitro* CAPACITY M.EQ./GM. RESIN	REFERENCES TO USE: HUMAN	REFERENCES TO USE: RAT
		I. PHENOLIC METHYLENE SULFONIC TYPES*			
Dowex 50	Liquonex CRW	Dow Chemical Co.	4.25	Dock[2] Irwin, et. al.[8]	
Duolite C 3		Chem. Process	3.25		Ch'en, et. al.[5]
Amberlite 1 R 100		Rohm and Haas	1.75		Ch'en, et. al.[5]
Ionac C-200		American Cyanamid	2.70		
Wofatite, P, K, KS		I. G. Farben	1.35 — 2.50		
Zeo Rex		Permutit Company	2.70		
Win 3000 (NH_4 form)		Winthrop Stearns		Kraus, et. al.[10]	McChesney, et. al.[7]
		II. NUCLEAR SULFONIC TYPES			
Nalcite HCR		National Aluminate	4.15		Ch'en, et. al.[5]
Amberlite X E 66		Rohm and Haas	4.2		
	Amberlite 1R 120	Rohm and Haas			McChesney, et. al.[7]
		III. CARBOXYLIC TYPES			
Amberlite X E 64		Rohm and Haas	10.0		
	Amberlite 1 R C 50	Rohm and Haas		Dock[2]	McChesney, et. al.[7]
Permitit X A C		Permutit Company			McChesney, et. al.[7]
Alkalex		Research Products Co.	4.95		
Wofatite C		I. G. Farben	7.00		
Amberlite X E 96 (NH_4 form)		Rohm and Haas		Elkinton[16]	
	Resodec (NH_4 and K forms)	Smith, Kline & French		Hay and Wood[15]	
Amberlite X E 64 plus Amberlite X E 58	Carbo-Resin (K and H forms plus anion resin)	Eli Lilly & Company		Chapman, et. al.[14] Martz, Kohlstaedt, et. al.[9]	

**In vitro* capacity from data of Kunin.[3] *In vivo* capacity for sodium derived from balance studies: 1/5 - 1/10 as great as *in vitro*. Sulfonic resins exchange at lower *p*H, hence bind a greater percentage of capacity with cation at physiological hydrogen ion concentration. Their *in vivo* uptake of cations is therefore almost equal to carboxylic resins despite their lesser *in vitro* capacity. See text and Figure 1 for details.

FIGURE I



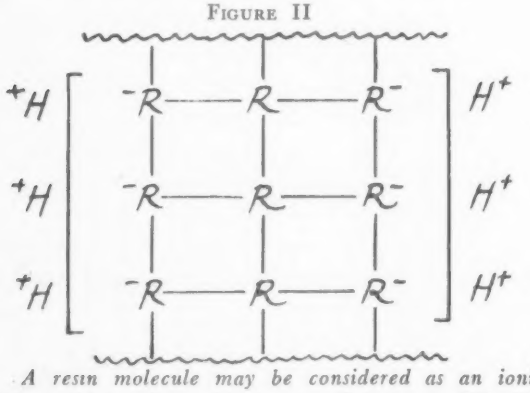
Milliequivalents of alkali per gram of resin (Nuclear sulfonic acid cation exchange resin).



Milliequivalents of KCl added per gram of dry resin (Carboxylic acid cation exchange resin).

is desired to liberalize dietary salt intake moderately without causing edema to reaccumulate. Clinical studies, mostly in abstract form, have been reported which show that patients with *cardiac edema* lose fluid on resin therapy, regain weight when it is discontinued, and in general can be maintained on resins alone plus restriction of so-

FIGURE II



A resin molecule may be considered as an ionic solid in which a large, highly cross-linked, non-diffusible and multivalent anion is electrically balanced by a large number of small, diffusible surface ions of opposite charge.

dium to three grams or less daily, whereas previously it had been necessary to supplement such therapy with mercury diuretics.[8-15] Figure III illustrates the findings in a typical case studied by Kohlstaedt. Acid resins will also potentiate the effects of mercury diuretics, probably in the same way as ammonium chloride accomplishes this effect.

Cirrhosis with ascites responds well to resin therapy. Such treatment permits a sufficiently high salt intake to allow adequate dietary protein and may therefore be particularly indicated in this condition.

Chronic nephritis with edema has responded to resin therapy.[11, 13, 14] However, since this condition is often associated with impairment of the capacity of the renal tubules to form ammonia, the possible development of acidosis represents a serious risk in using resins in this disease.

Acid resins would appear to be particularly useful in the treatment of *hyperpotassemia in anuric states.* Such patients were successfully treated by Elkinton with cation resins.[16] Although no clinical reports are available, it is theoretically possible to use acid resin therapy in the emergency treatment of *heavy metal poisoning. In vitro* arsenic, lead, mercury and other heavy metals have considerable affinity for resins; this characteristic deserves clinical trial. It is interesting to note that "terra sigillata", used in ancient and medieval times to counteract heavy metal poisoning, has been shown to be a form of silicate which has ion exchange properties.[8]

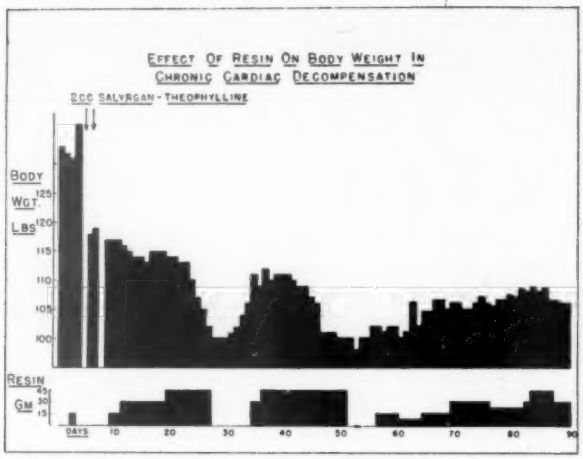
Dock[2] has suggested that acid resins may be used in any condition where sodium depletion is indicated. In addition to the conditions just discussed, *Meniere's Syndrome, hypertension,* and *fluid retention in adrenal steroid therapy* are particular examples of possible indications for resin therapy.

CHOICE OF RESIN

Sulfonic acid resins come in the form of brown beads and may be taken in capsules or as a dry cereal with cream. These bear various commercial names as indicated in Table 1. In general, they have a lesser capacity and convert to the cation form at a lower *p*H. They thus act like strong acids and may cause an unpleasant taste or produce local gastrointestinal irritation.

Carboxylic resins come as a fine powder and may be taken suspended in various fluids. They have a certain gritty taste, but this is not objectionable. Most investigators agree that the carboxylic resins produce fewer disagreeable side effects and are as efficient in removing sodium as the sulfonic resins. To prevent potassium deficiency, many investigators give potassium saturated resins in a 1:2 ratio with the acid form. Approximately 20 percent of the weight of this resin is potassium. The cation form, not being acidifying, produces no gastric irritation. Ammonium form resins are also used in conjunction with potassium resins[15] as in Resodec, but their superiority over potassium and hydrogen form resins is questionable. The use of anion as well as cation exchanger to prevent acidosis has not been extensively stud-

FIGURE III



ied. On the basis of preliminary studies Kohlstaedt believes the following ratio of resins to be preferred: 59 percent H resin, 29 percent K resin and 12 percent anion resin.[4] This mixture, to be called Carbo-Resin by Eli Lilly and Company is said to have the same *in vivo* efficiency as the acid-potassium mixtures.

DOSAGES AND HAZARDS OF THERAPY

The bulk of the resins introduce a practical problem. Forty-five to sixty grams daily in three divided doses is usually recommended, although as much as 100 grams has been given in some studies. The various types of commercial resins and those which have been used *in vivo* for cation exchange are summarized in Table 1. The sulfonic resins are usually given in capsule form. Twenty to twenty-five capsules were given with each meal in Irwin's study.[8] The dose of powdered carboxylic resin represents approximately four level teaspoons (16 grams) and is mixed with water, fruit juices*, or carbonated drinks and given three to four times daily between meals. The various proportions of acid, potassium, ammonium, or anion resins may be mixed in advance and a flavoring and dispensing agent added to improve its palatability. The resin should be administered daily from a few weeks to longer periods. It is important to remember that few immediate changes are produced and that both therapeutic and toxic effects are delayed in appearance (Figure III). For the immediate treatment of edema, parenteral mercury is to be preferred, while reserving resins for long-term management. Treatment up to periods of fifty-six weeks have been well tolerated.[9]

The hazards of treatment are real and this form of management should not be undertaken lightly. These substances are moderately constipating and fecal impactions have occurred, especially in the elderly and debilitated.[2] *Constipation* may be treated by enema or by any non-oily or non-saline laxative. Gastrointestinal symptoms occurring at the outset are due to *local gastric irritation* and the resin should be tried with meals or in some different vehicle. Sulfonic acid resins are particularly liable to produce such effects.

Late occurrence of gastrointestinal symptoms is probably the result of *acidosis*. Therapy should be controlled by frequent determination of blood carbon dioxide combining power particularly when nausea, vomiting, or hyperpnea occurring after several weeks on therapy suggest the development of this complication. It is particularly likely to occur in patients with renal impairment. Treatment consists of parenteral or oral alkali therapy. The use of combined anion and cation resin may eliminate this troublesome complication.

Potassium deficiency frequently occurs as a late manifestation when the acid resin alone is fed. This is manifested by profound muscle weakness, mental confusion, apathy, and at times by cardiac weakness. It is well to remember that these symptoms may precede a decline in serum potassium levels as intracellular potassium is first mobilized to meet a negative balance before blood levels fall. Repeated electrocardiograms should be taken during therapy, since progressive changes in T- waves and Q-T intervals may be the first sign of potassium depletion. Hypopotassemia in conjunction with digitalis therapy may lead to arrhythmias.[15] Administration of potassium resins at a level of fifteen grams per day will prevent this complication, but in some instances hyperpotassemia may be produced when renal failure is severe and particularly in the presence of anuria. A potassium resin should never be administered to an anuric patient.

Too successful achievement of the therapeutic objective may produce the *"salt depletion syndrome"* of mental confusion, weakness, dehydration, nausea, vomiting and collapse with hemoconcentration and azotemia. This occurs rarely in the presence of edema, but may develop very late in long-term maintenance therapy. The appearance of the patient and a rising N.P.N. will suggest the diagnosis, while parenteral or oral administration of salt solution will produce dramatic improvement. It is to be emphasized that this complication of resin therapy will probably not occur on diets containing more than one gram of sodium, unless mercury diuretics are also administered or there is renal failure to conserve sodium, as in severe chronic nephritis.

Among other less frequently encountered hazards is the production of *low-calcium tetany*. This has been observed occasionally and particularly when resin therapy is discontinued. The rising blood *p*H at this time may reduce calcium ion

*Kohlstaedt[4] points out that administration of resin with milk or fruit juices may reduce its ion exchange capacity because of the possibility of absorption of cations from the solution administered with the resin.

levels below the critical threshold. Oral administration of calcium is sometimes recommended to prevent this complication, but it should probably be used sparingly since otherwise it might tend to interfere with the efficiency of the cation exchanger. It is probably better to follow serum calcium levels from time to time and provide replacement therapy only as needed.

It is probable that exchange resin therapy will come to occupy a distinct place in clinical practice. The recent development of methods for controlling the complications of acidosis and hyperpotassemia remove the most serious objections to its routine employment. It is likely that greater experience will uncover new uses, but physicians must also be on their guard against the gradual development of as yet unrecognized deficiency states. Management of edema with these substances, while feasible, will probably never replace routine low sodium management where this alone produces satisfactory results.

SUMMARY

1. Resins which exchange hydrogen ions for cations with a high degree of efficiency have been synthesized and their chemical characteristics described. Several products are now available for clinical use.

2. Under suitable conditions from 0.5 to 1.5 grams of sodium may be removed from the feces by administering 60 grams of the resin daily. Depending on the dietary sodium intake, a patient may be kept in salt balance or depleted of body sodium stores by the use of resin therapy alone. By this method patients with edema can be slowly dehydrated and those with a tendency to fluid retention can be successfully maintained edema-free over long periods without the use of mercurial diuretics or with more liberal diets than would otherwise be required.

3. When acid resins alone are fed, potassium deficiency and acidosis are serious hazards of therapy. The administration of a proportion of the resin in the potassium form and the addition of a certain amount of anion exchange resin appear, from preliminary observations, to reduce or eliminate these risks.

4. Acid resins have been used to combat hyperpotassemia in anuric states. Their use to prevent certain forms of heavy metal poisoning is also suggested.

REFERENCES

1. Adams, B. A., and Holmes, E. L.: Absorptive Properties of Synthetic Resins, *J. Soc. Chem. Ind. 54*:1, 1935.
2. Dock, W.: Sodium Depletion as a Therapeutic Procedure. The Value of Ion Exchange Resins in Withdrawing Sodium from the Body, *Trans. Assoc. Am. Physicians 59*:282, 1946.
3. Kunin, R.: Ion Exchange, *Analyt. Chem. 21*:87, 1949.
4. Kohlstaedt, K. G.: Unpublished Observations.
5. Ch'en, J. S. and Freeman, S.: The Removal of Cations from Solutions and the Rat's Alimentary Canal by H-Form Resins, *J. Lab. Clin. Med. 35*:99, 1950.
6. Dock, W. and Frank, N. R.: Cation Exchangers: Their Use and Hazards as Aids in Managing Edema, *Am. Heart J. 40*:638, 1950.
7. McChesney, E. W. and McAuliff, J. P.: Effects of Some Ion Exchange Resins on the Mineral Metabolish of Rats, *Am. J. Physiol. 160*:264, 1950.
8. Irwin, L., Berger, E. Y., Rosenberg, B., and Jackenthal, R.: The Effect of a Cation Exchange Resin on Electrolyte Balance and Its Use in Edematous States, *J. Clin. Inv. 28*:1403, 1949.
9. Martz, B. L., Kohlstaedt, K. G., and Helmer, O. M.: Use of Ion Exchange Resins in the Management of Congestive Heart Failure and Cirrhosis of the Liver, *J. Lab. Clin. Med. (Proc.) 36*:962, 1950.
10. Kraus, H.: The Use of a Cation Exchange Resin in Patients with Cardiac Edema, *J. Clin. Invest. (Proc.) 29*:829, 1950.
11. Kahn, S. S. and Emerson, K., Jr.: Experience with the Use of Cation Exchange Resins in the Treatment of Edema, *J. Clin. Invest. (Proc.) 29*:827, 1950.
12. Currens, J. H., Counihan, T., and Rourke, M.: Observations on the Administration of Ammonium Cation Exchange Resin to Patients with Cardiac Edema, *J. Clin. Invest. (Proc.) 29*:807, 1950.
13. Danowski, T. S., Greenman, L., Mateer, F., Peters, J. H. Weigand, F. A., Mermelstein, H., and Clarke, C. E.: Carboxylic Cation Exchange Resin Studies in Animals and Humans, *J. Clin. Invest. (Proc.) 29*:-807, 1950.
14. Chapman, D. W. and Ponwill, C. H.: The Effect of a New Cation Exchange Resin on Edematous States and Electrolyte Balance, *J. Lab. Clin. Med. 36*:808, 1950.
15. Hay, S. and Wood, E. J.: Cation Exchange Resins in the Treatment of Congestive Heart Failure, *Ann. Int. Med. 33*:1139, 1950.
16. Elkinton, J. R., Clark, J. K., Squires, R. D., Bluemle, L. W., and Crosley, A. P.: Treatment of Potassium Retention in Anuria with Cation Exchange Resin, *Am. J. Med. Sci. 220*:547, 1950.

by WALTER F. HITZELBERGER
chief pharmacist
and R. C. SLANKER
head pharmacist

the pharmacy

LOS ANGELES COUNTY

general hospital

Before reviewing the scope and activities of the Pharmacy in the Los Angeles County General Hospital, a brief explanation seems necessary in order that the reader may be informed of the position occupied by the hospital in the over-all program of the County Department of Charities.

Our hospital is located in the city of Los Angeles in an area which makes it rather centrally located in relation to the county at large. Population of Los Angeles county including the city of Los Angeles, is over four million.

This hospital is one of the many departments of the L.A. County Charities Department and the largest of five institutions used in the care of the indigent sick. It also renders emergency hospital service to the general public. The Pharmacy operates as an individual department under the supervision of the director of the hospital and supplies medications for an average daily load of 3,300 inpatients and for an outpatient load reaching 2,000 visits per day. In addition, the Pharmacy supplies medications for the Outside Medical Relief program which, in area, covers the entire county outside of metropolitan Los Angeles. Medications are also furnished for Juvenile Hall, the mental health patients that are under county jurisdiction located in private rest homes, and the County Health Department activities.

The Los Angeles County General Hospital Acute Unit; Power house and tunnel from the old hospital shown at lower left. Nurses living quarters at the lower right.

The pharmacy staff numbers forty-eight, of which twenty-one are registered pharmacists. This staff is deployed in the services of our two pharmacies. One pharmacy is a Prescription Dispensing Pharmacy located on the second floor (clinic floor) of the Acute-Unit Building (M.D.) and is staffed by eight pharmacists, while the Main Pharmacy, which includes administrative, manufacturing and prescription departments, is located in the Pharmacy Building and employs the remainder of our personnel. The Pharmacy Building is located in the older section of the hospital grounds and is connected to the Acute-Unit by means of a tunnel. This building is a five story class-A structure, three floors of which are now being used by the Pharmacy, with a total floor space of 20,000 square feet. We have an additional 3,000 square feet in an adjacent building for container storage. Plans have been submitted for enlarging the Pharmacy using 4½ floors of the pharmacy building. This would add some 8,600 additional square feet. Two freight and two passenger elevators facilitate the movement of stock and personnel within the building.

The Pharmacy is open from 8:00 A.M. to 5:00 P.M., Monday through Friday, 8:00 A.M. to 4:30 P.M. Saturday and holidays, and is closed Sunday.

Statistics given in this article are included with the hope that they might be of benefit to the hospital pharmacist who might want to compare facilities or to install similar services of their own

It is our belief that most hospital pharmacists are interested in production costs, so in the description of our various departments we will endeavor to include our cost-findings. All labor costs mentioned include a 45 percent general overhead. This figure of course will vary in different institutions, but should be considered in making comparisons.

ADMINISTRATIVE AND RECORDS DEPARTMENT

This department has the offices of the chief pharmacist and the head pharmacist and in addition keeps all records for the Pharmacy. All narcotics received and issued are kept in a perpetual inventory. All purchase requisitions are written here and stock records are filed in a Kardex system for easy reference. Records of items manufactured, including amounts and costs, are filed in Kardex file. These records are incorporated into a yearly report which is sent to the hospital director. One clerk acts as time keeper.

STOCK ROOM

The stockroom occupies about 2,200 square feet of floor space on the third floor of the Pharmacy Building. Here the stockman receives, checks, and prices the incoming stock which is later issued to the various departments. Additional storage space for barrel stock and containers is provided in adjacent buildings.

MANUFACTURING DEPARTMENT

The galenical manufacturing department of this Pharmacy is unique in that it always seems to be a stride or two ahead of its time. This department is always busy keeping its many items in stock, yet seems to meet the demands for new and changing formulas with minimum delay and confusion. This facility occupies 4,200 square feet of floor space on the third floor of the Pharmacy Building and in the fiscal year of 1949-50 produced 61,556 gallons of solutions, syrups, elixirs, mixtures and such; 8,659 pounds of ointments, and 22,662 tubes of ointment in various sizes. Many of these preparations are hospital formula items and are unobtainable from outside sources in the relatively small quantities used. The above represents 290 items manufactured in this department at a savings of $50,000. Equipment in this department consists of ten 50-gallon stainless steel tanks with motor mixers, two Alsop power filters, two Hobart mixers, one colloid machine, one ointment mill, one Colson hand tubing filler with closer and crimper, and a dry-heat sterilizer. A separate room is used for storage of isopropyl alcohol and tax-free ethyl alcohol.

MANUFACTURE LARGE VOLUME STERILE PARENTERAL SOLUTIONS (LITERS)

This department occupies 3,040 square feet of floor space which is divided into bottle-sorting and wash room, manufacturing and filling room, and a sterilizer room. The sterilizer room is also used as a storage room for the finished product. This we consider to be one of the most important departments of the pharmacy. By having the complete cooperation of our administrative and medical directors and employing the principles of long range planning, we have been able to watch this department grow steadily, providing uninterrupted service to the hospital of from 100 liters per day a few years ago to the present output of 900 liters daily. During the year ending June 30, 1950, 204,707 liters of sterile solutions were manufactured. Of these, 7,532 units (3.3 percent) were rejected for various reasons. The labor cost per unit (including 45 percent general overhead) was $0.139. The containers are of course reused, but broken containers, caps and rubber inserts must be replaced. The replacement container cost is $0.014 per unit. Cost of contents of material used in the manufacture varies from one to six cents per unit. The average saving per unit was $0.51 plus. Twenty-three

different formulas are prepared in this type and size container, most of which are dextrose, sodium chloride and combinations thereof. Equipment consists of three water stills with a total capacity of 90 gallons per hour, one stainless steel mixing tank (100 gallon capacity) with motor agitator, two monel metal filling tables with built-in sink, two vacuum filling handles, five stainless steel autoclaves with a capacity of 100 liters per heat, and a power filter using asbestos-type filter pads. The stills are located on the third floor of the building and the distilled water is delivered by gravity to the first floor mixing room by means of tin-lined brass pipe.

MANUFACTURE STERILE AMPUL VIALS -- 15 CC., 30 CC., 60 CC.

Our sterile ampul department occupies 374 square feet of floor space and equipment consists of several 20-liter Pyrex bottles used in mixing and filtering. A Buchner funnel using asbestos-type filter pads and an aspirator is used for filtering. Similar equipment is used for the one and two liter size filtering equipment. Filling of small quantities is done by hand and the larger quantities are filled on a vacuum machine with a capacity of about 400 vials per hour. A West capping machine is used to crimp the single-shell aluminum caps on the vials over the plug-type rubber closure. During the fiscal year 1949-50 this department produced 140,067 vials representing 80 different types and sizes. The labor cost per ampul, including 45 percent overhead, was $0.1097 and the container replacement cost was $0.02, effecting a savings of over $40,000.

PRESCRIPTION DEPARTMENT

Prescription pharmacy service is maintained in both the General Hospital (M.D.) and the Osteopathic Hospital (D.O.) These two units are required because of the geographical location of the two hospital services. The M.D. Unit is located in the Acute Unit of the hospital, second floor, and occupies some 1,200 square feet. This Pharmacy contains eight prescription cases and a narcotic counter, one ward window for emergency ward supplies, one prescription-receiving window, and two prescription-delivery windows opening directly into the patient waiting room.

The prescription department serving the Osteopathic Service is located in the Main Pharmacy Building, second floor, and near the entrance to the Osteopathic Hospital.

Prescriptions for three classes of patients are filled in these two units, namely: outpatients, inpatients and the Outside Medical Relief (O.M.-R.) patients. Seventy-nine percent of the prescriptions are for outpatients, 17 percent for inpatients,

ABOVE: *Prescription room in main pharmacy building; a section of the ampul vial room showing filter set-up at right and hand filling apparatus. Sterilizer trays filled with vials are seen on truck at left.*

BELOW: *A view of the receiving window (in background) and prescription cases in dispensing room of the acute unit. One side of the galenical manufacturing room showing mixer, homogenizer, two Hobart mixers, gas plates, sink, and at far end a colloid mill. Stock barrels in foreground.*

and 4 percent for the O.M.R. About 70 percent of the outpatient prescriptions bear a typed-label with the number, date, directions for use, patient's name and number, and the doctor's name. Some 30 percent are of the "handout type". This handout prescription is a packaged item bearing a printed stock direction and the identifying O.P.D. number. They comprise the less potent drugs such as aluminum hydroxide gel, aspirin tablets, etc. that the retail pharmacist is allowed to sell over the counter. During the fiscal year 1949-50, our prescription department filled 241,372 prescriptions or 965 per working day.

OUTSIDE MEDICAL RELIEF (O.M.R.)

The Outside Medical Relief system requires some explanation to show its relations to the Pharmacy. The county of Los Angeles is a large one and although the Charities Department of the county has several other outlets for medications for indigents, our Pharmacy furnishes most of the medications used by the patients classified in the O.M.R. Some 592 physicians M.D. and 119 physicians D.O. plus 13 dentists, located at various points in the county outside of the metropolitan area, have contracted with the county to furnish medical service to indigent patients in their immediate neighborhood. They are paid a nominal fee for office and house calls. In a like manner, 90 retail pharmacies have been contracted by the county to dispense medications to indigent patients for a nominal fee per prescription. Most of the medications dispensed by these pharmacies are furnished by our hospital pharmacy and consist of prepackaged prescriptions bearing an O.P.D. number to identify the contents. The O.M.R. contract physician is furnished a Formulary showing ingredients and O.P.D. number of the prepackaged prescriptions, and the patient, upon receipt of the written prescription selected by the physician, takes it to the nearest Contract Pharmacy for filling. The pharmacist then selects the proper package from the initial stock furnished him by the hospital pharmacy, writes in the doctor's directions for use and delivers it to the patient upon receiving patient's signature on the prescription. At weekly intervals these prescriptions are sent to our Pharmacy and the items indicated thereon are replaced on the shelves of the Contract Pharmacy. During the fiscal year 1949-50, 232,744 such packaged prescriptions were delivered to Contract Pharmacies throughout the county.

In the event the physician prescribes medications not in the Formulary, the Contract pharmacist is allowed to fill the prescription from his own stock and bill the county for his charge if the cost does not exceed a certain set figure. For large amounts and for costly drugs the prescriptions are usually channeled through our hospital pharmacy, which fills and mails the medication to the physician or patient. During the last fiscal year, 9,694 such prescriptions were filled and mailed.

The O.M.R. Department was inaugurated to care for patients living at great distances from any of the county facilities. The transportation problems encountered would be tremendous and the increase in the outpatient loads at the various institutions would be too large to handle if the patients were able to get to the hospital clinics. For example, one of our Contract Pharmacies is located 80 miles from the General Hospital.

PACKAGING DEPARTMENT

This department repacks bulk liquids, ointments, and tablets in the sizes needed for dispensing. Tablets are either measured, weighed or counted. Liquids packaged in small containers (½ to 3 oz.) are filled from five-gallon containers, and the 4 oz. to 32 oz. bottles are filled on a semi-automatic filling machine from 50-gallon tanks located in the galenical manufacturing department one floor above the filling room. A plastic hose connects the tanks with the filling machine. Five different types of labels are used depending on which department the preparations are going to be dispensed. These include:

Shop label packages for use on the hospital wards.

Prepackaged prescriptions to be labeled by our prescription department.

Prepackaged prescriptions to be labeled by Contract pharmacists.

Handout prescriptions for our Outpatient Department.

Handout prescriptions for the Admitting Room.

During the time the clinics are closed, the Admitting Room Medical Staff of the hospital functions as a general clinic. Outpatients who appear for treatment are examined by the Admitting Room physician. If the patient does not need hospitalization, but does need symptomatic medication, he is given such medication and possibly an appointment slip to attend the indicated clinic at a later date. The Pharmacy supplies a small stock of prepackaged prescriptions for this purpose. In this packaging department, we employ the services of pharmacy-helpers under the supervision of a pharmacist. We package about 900,000 units of all types per year at the average rate of 600 packages per day per operator.

DELIVERY DEPARTMENT

The Pharmacy has seven delivery trucks to deliver an average of 3,600 drug boxes per month. The trucks are hauled from the Pharmacy to elevators in the hospital by means of an electric tram. Deliveries are made by pushing the trucks from ward to ward, leaving the boxes of drugs as per order and picking up the empty containers for return to the Pharmacy.

BOTTLE WASHING DEPARTMENT

The empty bottles that are returned to the Pharmacy from the wards and found suitable for reuse are sorted as to size and type and then placed in a machine which washes the bottle for four minutes with hot detergent solution and then rinses for one minute with tap water. This machine has an output of 480 bottles per hour, and complies with all the Health Department regulations. Our bottle washing department washes on an average of 50,000 bottles per month at a cost of less than three cents per bottle. This cost includes labor, overhead, detergents and depreciation of equipment.

WARD ORDER ASSEMBLY

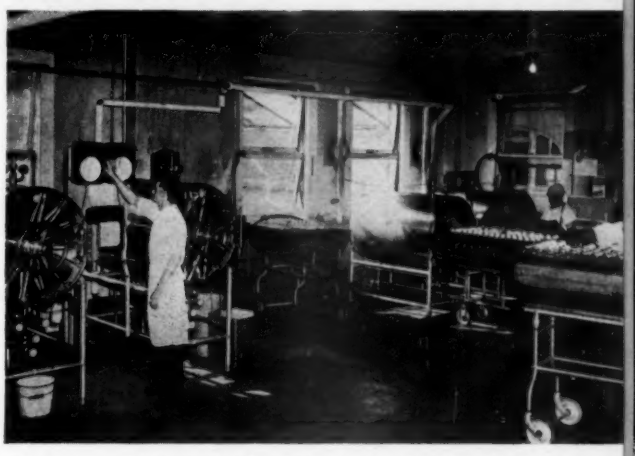
Drug orders for the wards are filled all day during the five days of the week. Although our pharmacies are open on Saturday, we fill no ward orders unless they are emergencies. Nearly all of the items making up the ward orders are prepackaged and stored on shelves for efficient assembly. About 250 ward orders are filled each working day, including narcotic orders and special orders. Narcotic and special order items are not delivered, but are picked up and signed for by ward personnel.

For the convenience of the Nursing Department, a printed form is furnished containing the more frequently used preparations. In addition, a blank form is used for the writing-in of items not listed on the printed form. During the fiscal year 1949-50, 1,243,482 items (individual packages) were dispensed to the various wards, surgeries, laboratories, clinics and admitting rooms.

CONCLUSION

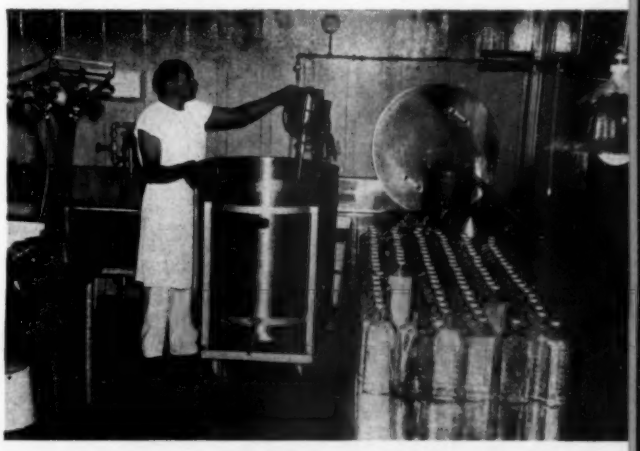
We have tried to give a word picture of our Pharmacy's work program. We, like many other hospital pharmacists, are called upon to develop new technics, new ointments and ointment bases for use in dermatology, mixtures of preparations that might be more suitable for use in pediatrics, special preparations for parenteral use, etc., and like the rest of you, we are trying to find the time to adequately keep abreast of the newer developments.

Although our endeavors in the field of practical pharmacy have resulted in substantial monetary savings, it should be emphasized that our activities have, to a greater degree, been primed by the desire to render a more complete and efficient pharmaceutical service to our institution. In many instances our Pharmacy has been able to fulfill approved requests from our medical staff for needed preparations that were not as yet available on the market. We believe this type of service to be worthwhile.



ABOVE: *Section of the galenical manufacturing room showing 50 gallon stainless steel and glass lined tanks, mixer and power filters. A view of the sterilizing room showing sterilizers, trucks, trays and washrack. Liter I.V. solutions in trays.*

BELOW: *A view of the I. V. manufacturing and filling room showing monel metal tables, 100 gallon tank, mixer and vacuum filling handles. Semi-automatic bottle filling machine and assembly line crew.*



Suggested Equipment Lists for HOSPITAL PHARMACIES

50, 100 and 200 Bed General Hospitals

DIVISION OF HOSPITAL FACILITIES

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY

Approved by the
Division of Hospital Pharmacy, American Pharmaceutical Association
and American Society of Hospital Pharmacists

THE equipment lists herein presented are suggested as guides and adapted to the schematic drawings in the publication "Suggested Plans for Hospital Pharmacists, 50, 100 and 200 Bed General Hospitals", prepared by the Division of Hospital Facilities, Public Health Service.[1]

Care should be exercised in the use of these lists since variations in requirements will arise as local designs and plans differ from the guide plans upon which these equipment lists were based.

Since the word "equipment" is broadly used, it has been recommended from an accounting standpoint that all equipment be classified in three groups as follows:[2]

Group I contains permanent or fixed equipment (depreciable). Such items are considered as built-in equipment and usually included in the construction contract.

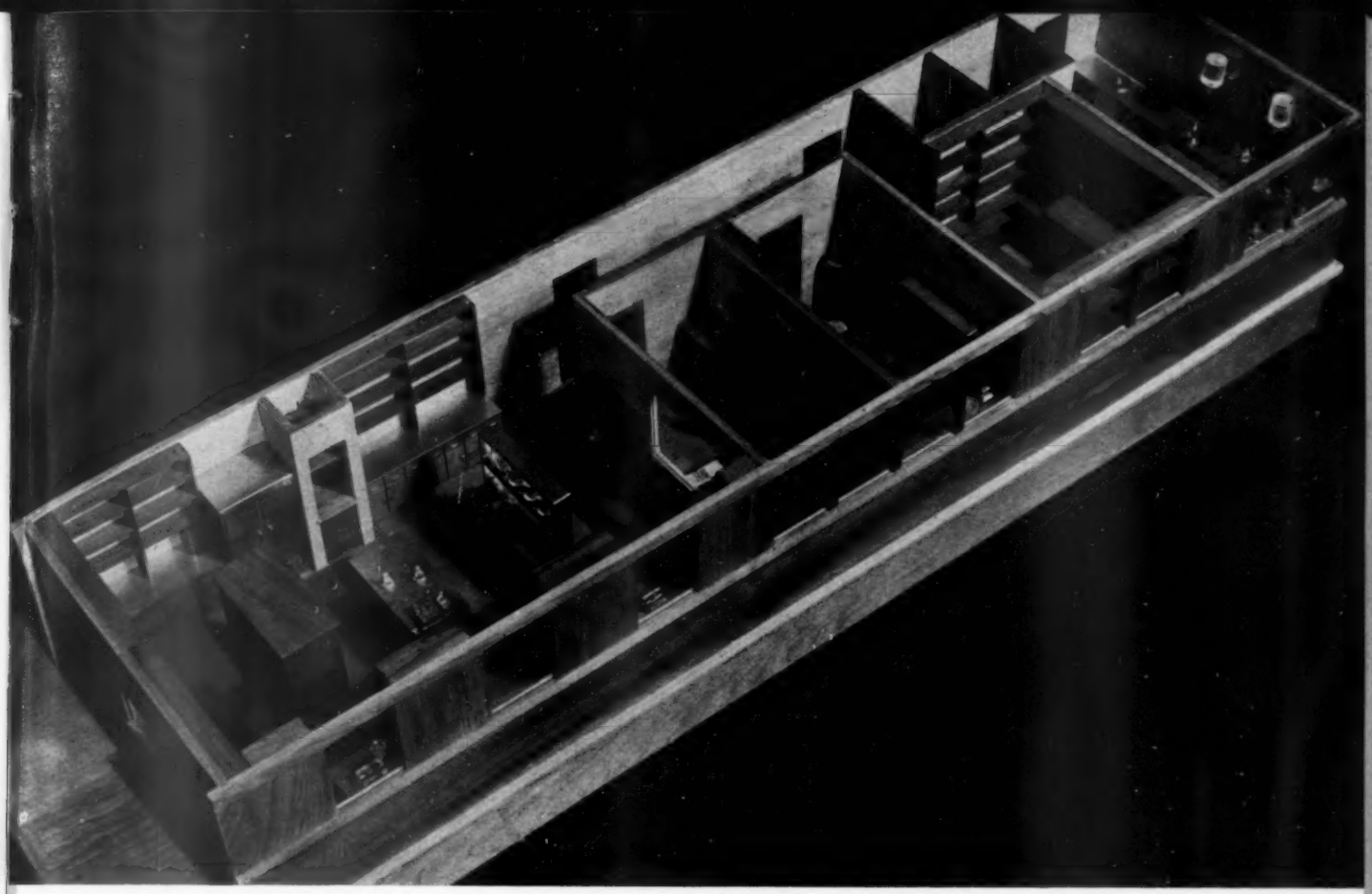
Group II generally contains movable equipment (depreciable) having a minimum life of at least five years and not normally purchased through construction contracts.

Group III generally contains minor equipment (non-depreciable) subject to requisition and having a life of not more than five years. Such items are normally purchased through other than construction contracts.

The format of presentation permits comparison of the relative needs of the three sizes of hospitals indicated. Such presentation in turn offers a guide to needs and requirements to hospitals of interim size.

In addition, the format permits the use of this list as a guide in order to meet the "Minimum Standard for Pharmacies in Hospitals".[3] For example, the hospital pharmacy should have standard textbooks on pharmacy, pharmacology, etc.,

Prepared by ALEX M. MILNE and GUY H. TRIMBLE under the direction of JOHN W. CRONIN, medical director, chief, Division of Hospital Facilities.



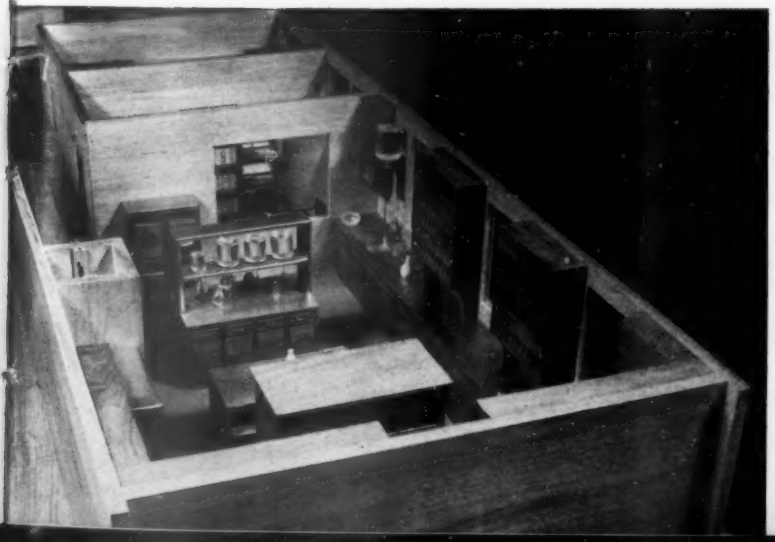
as well as those books in the essential list.

The symbol indications used on these lists have definite meanings as follows:

1. (blank space); indicates that the item is required, but the quantity is not determined. Quantity is dependent upon correlation of the schematic plans.
2. -(hyphen); indicates the item is not applicable to the particular hospital size group.

REFERENCES

1. Milne, A. M. and Taylor, W. R.: Suggested Plans for Hospital Pharmacies; 50, 100 and 200 Bed General Hospitals, *Bull. Am. Soc. Hosp. Pharm.* 7:122 (May-June) 1950.
2. *Handbook on Accounting Statistics and Business Office Procedure for Hospitals,* Section 1, American Hospital Association, 1950.
3. Minimum Standard for Pharmacies in Hospitals, *Bull. Am. Soc. Hosp. Pharm.* 7:31 (Jan.-Feb.) 1950.



Photos of model for a 200 bed hospital recommended by the U. S. Public Health Service

Pharmacy Department (Plans 16, 17, 18 Revised)

	Suggested Quantity Bed 50	Bed 100	Bed 200	Local Requirements Unit No.	Unit Price	Total Cost
COMPOUNDING AND DISPENSING LABORATORY . .	1	1	1			
GROUP I EQUIPMENT						
Blinds, window						
Book shelves	2	2	-			
Cabinet, adjustable shelves	1	1	1			
Cabinets, drug, sectional type	1	1	1			
Cabinet, drug, sectional type, with shelf above counter	1	1	1			
Clock outlet and electric clock	1	1	1			
Counter, cabinets and drawers below	1	1	1			
Counter, prescription, cabinets and drawers below	1	1	1			
Counter, 18 inches wide, adjustable shelves below	-	1	-			
Counter, shelves below, adjustable, open	1	-	-			
Dumbwaiter, electric ...	-	1	1			
Dutch door	1	-	-			
Rack, carboy, above counter	1	1	-			
Rack, filter, above counter	1	1	-			
Rack, carboy	-	-	1			
Shelf, above counter ...	-	-	1			
Shelves, adjustable, open, starting 18 inches above counter	1	1	1			
Sink, acid resisting with gooseneck spout and drainboard, graduate rack above, cabinets below	1	1	2			
Tank, resistant glass, distilled water, 12 gallon, wall mounted	-	-	1			
Tank, resistant glass, distilled water, 5 gallon, wall mounted	1	-	-			
Window, dispensing ...	-	1	1			
GROUP II EQUIPMENT						
Balance, prescription, class A, sensitivity 2 mg.*	1	1	2			
Balance, prescription, heavy duty, sensitivity 15 mg.*	1	1	1			
Cabinet, filing, card size, 3 x 5 inches	1	2	-			
Cabinet, filing, letter size, 4 drawers	-	1	-			
Cabinet, filing, letter size, 2 drawers	1	-	-			
Cabinet, prescription, filing	1	1	1			
Can, waste, foot lever ..	1	1	2			
Chair, office, swivel with arms	1	1	-			
Desk, office, single pedestal	1	1	-			
Filler, for sterile capped vials	1	-	-			
Homogenizer, hand	1	-	-			
Hot plate, double element, electric, heavy duty	1	1	-			
Lamp, desk	1	1	-			
Mixer, electric, portable, counter type	1	1	1			
Refrigerator, 8 cubic feet, with biological drawers	1	-	-			
Refrigerator, 16 cubic feet, with biological drawers	-	1	-			
Refrigerator, 32 cubic feet, with biological drawers	-	-	1			
Safe, narcotic	1	1	1			
Scale, counter, 4½ kg. capacity*	1	1	-			
Stool, adjustable, operator's, 19-25 inches ...	1	1	1			
Typewriter, standard ..	1	1	2			
Weight, lacquered brass, cylindrical body with knob, fractionals of aluminum, tolerance Class C, U. S. Bureau of Standards Metric, 1 mg. to 500 mg., 1 Gm. to 500 Gm. set	1	1	1			
Apothecary, ¼ gr. to 8 drams, set	1	1	1			
ACTIVE STORAGE ROOM & MANUFACTURING AREA	-	1	-			
GROUP I EQUIPMENT						
Blinds, window						
Counter, cabinets below, shelves above	-	1	-			
Shelves, 12 inches wide, adjustable, open	-	1	-			
Shelves, 24 inches wide, 36 inches high, adjustable, open	-	1	-			
Sink, with gooseneck spout and drainboard, graduate rack above, cabinet below	-	1	-			
Still, water, 2 gallon per hour**	-	1	-			

*Must conform to state or city minimum requirements.

**Required if parenteral solution laboratory is omitted.

	Suggested Quantity Requirements			Local		
	Bed 50	Bed 100	Bed 200	Unit No.	Unit Price	Total Cost
Tank, resistant glass, distilled water, 5 gallon, wall mounted	-	1	-			
GROUP II EQUIPMENT						
Mixer, portable, electric, long shaft for tank...	-	1	-			
Tank, mixing, 20 gallon, mounted on stand with casters	-	1	-			
ALCOHOL VAULT	-	1	1			
GROUP I EQUIPMENT						
Shelves, metal, starting 42 inches above floor	-	1	1			
Vent, inlet and outlet..	-	1	1			
GROUP II EQUIPMENT	-	-	-			
PARENTERAL SOLUTION LABORATORY	-	1	1			
GROUP I EQUIPMENT						
Blinds, window						
Cabinet, adjustable shelves	-	1	1			
Cabinet, storage, open, adjustable shelves ...	-	1	1			
Cleaner, bottle, pressure type	-	-	1			
Counter, cabinets and drawers below	-	1	1			
Counter, open below ...	-	1	1			
Drip pan with waste connection in counter top	-	1	1			
Rack, bottle	-	3	3			
Sink, gooseneck spout ..	-	-	1			
Sink, with distilled water rinser, omit hot and cold water supply, cabinets below	-	1	1			
Sink, two compartment, gooseneck spout, cabinets below	-	1	-			
Sterilizer, pressure, corrosive resistant, 24 x 36 x 48 inches	-	1	1			
Still, water, 5 gallon per hour	-	1	-			
Still, water, 10 gallon per hour	-	-	1			
Tank, resistant glass, distilled water, 12 gallon, wall mounted	-	2	2			
GROUP II EQUIPMENT						
Can, waste, foot lever .	-	1	1			
Carriage, sterilizer, solution, under counter ..	-	1	1			
Filler, for sterile capped vials	-	1	1			
Hot plate, double element	-	1	1			
Meter, conductivity	-	1	1			
Oven, hot air, 24 x 14 x 14 inches, on counter	-	-	1			
Pump, suction and pressure, with gauges	-	1	1			
Scale, metric solution, with sliding poise and tare beam	-	1	-			
Stool, adjustable, operators, 19-25 inches ...	-	1	1			
GROUP III EQUIPMENT						
Adapter, glass, Luer, heat resistant	-	48	48			
Burette, measuring, standard set, for parenteral solutions	-	-	5			
Burette, measuring, 1000 cc., for parenteral solutions	-	2	-			
Bushing, rubber, for flask	-	144	200			
Clamp, flow control, parenteral solution tubing	-	24	48			
Closures, for flask	-	144	200			
Filter, glass, fritted, 600 ml.	-	2	2			
Flask, glass, heat resistant, graduated, 1000 cc. capacity	-	100	200			
Flask, glass, heat resistant, graduated, 500 cc. capacity	-	50	100			
Holder, flask	-	12	24			
Tag, identification, stainless steel	-	48	96			
MANUFACTURING LABORATORY	-	-	1			
GROUP I EQUIPMENT						
Blinds, window						
Cabinets, adjustable shelves						
Counter, cabinets and drawers below	-	-	1			
Outlet, hot and cold water	-	-	1			
Rack, filter	-	-	1			
Sink, two compartment, with drainboard, gooseneck spout, cabinets below	-	-	1			
Still, water, 2 gallon per hour	-	-	1			
Tank, resistant glass, distilled water, 12 gallon, wall mounted	-	-	1			
GROUP II EQUIPMENT						
Can, waste, foot lever ..	-	-	1			
Filter, press, suction-pressure type, approximately 2-5 gallon per minute, mounted on casters	-	-	1			
Hot plate, double element, electric, heavy duty	-	-	1			
Mill, colloidal	-	-	1			
Mixer, portable, electric, long shaft for tank ..	-	-	1			
Scale, counter, 4½ kg. capacity	-	-	1			

	Suggested Quantity Requirements			Local		
	Bed 50	Bed 100	Bed 200	Unit No.	Unit Price	Total Cost
Tank, mixing or storing, 20 gallon, mounted on stand with casters ...	-	-	2			
ACTIVE STORAGE ROOM	-	-	1			
GROUP I EQUIPMENT						
Blinds, window						
Locker, clothes	-	-	1			
Rack, barrel	-	-	1			
Shelves, 12 inches wide, adjustable, open	-	-	1			
Shelves, 24 inches wide, 36 inches high, adjustable	-	-	1			
GROUP II EQUIPMENT	-	-	-			
OFFICE AND LIBRARY . .						
Blinds, window	-	-	1			
Glass panel	-	-	1			
GROUP II EQUIPMENT						
Book case	-	-	1			
Cabinet, filing, card size, 3 x 5 inches	-	-	2			
Cabinet, filing, letter size, 4 drawer	-	-	2			
Chair, office, straight ..	-	-	1			
Chair, office, swivel, with arms	-	-	1			
Desk, office, double pedestal	-	-	1			
Lamp, desk	-	-	1			
Rack, magazine	-	-	1			
Table, office, 24 x 36 inches	-	-	1			
PHARMACY DEPARTMENT						
GROUP III EQUIPMENT						
Baskets, drug	2	4	8			
Beaker, glass, low form with spout, 50 ml. ..	2	4	8			
Beaker, glass, low form with spout, 150 ml. ..	3	3	3			
Beaker, glass, low form with spout, 250 ml. ..	3	3	3			
Beaker, glass, low form with spout, 600 ml. ..	2	2	2			
Beaker, glass, low form with spout, 1000 ml. ..	2	2	2			
BOOKS, ESSENTIAL						
United States Pharmacopoeia XIV, 1950, and Supplements	1	1	1			
National Formulary IX, 1950, and Supplements	1	1	1			
New and Nonofficial Remedies, latest edition (published annually)	1	1	1			
United States Dispensatory, 24th Edition, 1950, by A. Osol and E. E. Farrer	1	1	1			
Merck Index (temporarily out of print) ...	1	1	1			
Merck Manual, Eighth Edition, 1950	1	1	1			
Modern Drug Encyclopedia and Therapeutic Guide, Fourth Edition, 1949, and Quarterly Supplements, by Marion E. Howard	1	1	1			
U. S. Treasury Department, Bureau of Narcotics, *Regulation No. 5*	1	1	1			
Bureau of Internal Revenue Draw Back of Tax on Alcohol, *Regulation No. 20*	1	1	1			
Federal Food, Drug, and Cosmetic Act and General Regulations for Its Enforcement	1	1	1			
Copies of State and Municipal Pharmacy Laws and Sanitary Codes ..	1	1	1			
BOOKS, SUPPLEMENTAL						
American Pharmacy, Volumes I (1945), II (1947), and III (1949) by A. L. Lyman	1	1	1			
The Art of Compounding, Eighth Edition, 1951, by Glenn L. Jenkins, Edward A. Brecht, Don. E. Francke, and Glen J. Sperandio	1	1	1			
Manual of Pharmacology, Seventh Edition, 1948, by T. Sollman	1	1	1			
Pharmaceutical Arithmetic, Second Edition, 1947, by Ignatius J. Bellafiore	1	1	1			
Pharmaceutical Dispensing, Fourth Edition, 1951, by W. J. Husa..	1	1	1			
Pharmacological Basis of Therapeutics, First Edition, 1941, by L. Goodman and A. Gilman	1	1	1			
Remington's Practice of Pharmacy, Tenth Edition, 1951, by E. F. Cook and E. W. Martin	1	1	1			
American Illustrated Medical Dictionary, 21st Edition, 1947, by W. A. Newman Dorland	1	1	1			
OR						
Blakiston's New Gould Medical Dictionary First Edition, 1949, by H. W. Jones, N. L. Hoerr, and A. Osol..	1	1	1			

	Suggested Quantity			Local Requirements		
	Bed 50	Bed 100	Bed 200	Unit No.	Unit Price	Total Cost
Bottle, glass, carboy, 5 gal.	2	4	8			
Bottle, glass, 2 gal.	4	6	10			
Brush, bottle	6	6	6			
Burner, Bunsen with pilot flame and stopcock	2	2	2			
Dish, evaporating, porcelain, with pour out, 150 ml. capacity, 100 mm. diam.	2	2	2			
Dish, evaporating, porcelain, with pour out, 385 ml. capacity, 145 mm. diam.	2	2	2			
File, prescription, standard binder and box to hold 1000	2	2	6			
Flask, glass, Erlenmeyer, narrow mouthed, 125 ml.	2	2	2			
Flask, glass, Erlenmeyer, narrow mouthed, 250 ml.	2	2	2			
Flask, glass, Erlenmeyer, narrow mouthed, 500 ml.	2	2	2			
Funnel, glass, plain, 50 mm. diam., 30 ml. approx. capacity	1	1	1			
Funnel, glass, plain, 90 mm. diam., 120 ml. approx. capacity	1	1	1			
Funnel, glass, ribbed, 2 oz. approx. capacity, 2⅜ inches diam.	1	1	1			
Funnel, glass, ribbed, 4 oz. approx. capacity, 3½ inches diam.	1	1	1			
Funnel, glass, ribbed, 8 oz. approx. capacity, 4¼ inches diam.	1	1	1			
Funnel, glass, ribbed, 32 oz. approx. capacity, 7 inches diam.	1	1	4			
Funnel, metal, 4 oz. approx. capacity, 3⅛ inches diam.	1	1	1			
Funnel, metal, 8 oz. approx. capacity, 4 inches diam.	1	1	1			
Funnel, metal, 16 oz. approx. capacity, 6½ inches diam.	1	1	2			
Funnel support - *See Support Stand*						
Graduate, glass, conical, double scale, 5 ml. and 60 min.	3	3	3			
Graduate, glass, conical, double scale, 10 ml. and 120 min.	3	3	3			
Graduate, glass, conical, double scale, 60 ml. and 2 oz.	3	3	3			
Graduate, glass, conical, double scale, 125 ml. and 4 oz.	3	3	3			
Graduate, glass, conical, double scale, 250 ml. and 8 oz.	2	2	2			
Graduate, glass, conical, double scale, 500 ml. and 16 oz.	1	1	1			
Graduate, glass, conical, double scale, 1000 ml. and 32 oz.	1	1	2			
Holder, label, typewriter	1	1	1			
Label moistener	1	1	1			
Machine, numbering, repeat movement	1	1	1			
Measure, metal, graduated, double scale, 500 ml. and 16 oz.	1	1	2			
Measure, metal, graduated, double scale, 1000 ml. and 32 oz.	1	1	2			
Mold, suppository compressor	1	1	1			
Mold, tablet triturate	1	1	1			
Mortar, wedgewood, and Pestle, wooden handle, No. 0000, 2 oz. capacity	1	1	1			
Mortar, wedgewood, and Pestle, wooden handle, No. 00, 5 oz. capacity	1	1	1			
Mortar, wedgewood, and Pestle, wooden handle, No. 1, 10 oz. capacity	1	1	1			
Mortar, wedgewood, and Pestle, wooden handle, No. 3, 16 oz. capacity	1	1	1			
Mortar, wedgewood, and Pestle, wooden handle, No. 5, 32 oz. capacity	-	1	1			
AND/OR						
Mortar and Pestle, glass, 2 oz. capacity	1	1	1			
Mortar and Pestle, glass, 4 oz. capacity	1	1	1			
Mortar and Pestle, glass, 8 oz. capacity	1	1	1			
Mortar and Pestle, glass, 16 oz. capacity	1	1	1			
Ointment slab - *see Pill-tile*						
Percolator, graduated, metric, 2000 ml., 4 pints	1	1	1			
Pill-tile, porcelain or glass, 10 x 12 inches	1	1	1			
Pipette, measuring, desired size	1	1	1			
Punch, prescription	1	1	1			
Register, narcotic and exempt narcotics	1	1	1			

	Suggested Quantity Requirements			Local Requirements		
	Bed 50	Bed 100	Bed 200	Unit No.	Unit Price	Total Cost
Ring Stand - *see Support stand*						
Rods, stirring, glass or composition, assorted lengths	1	1	1			
Scoop, No. 1, 3¼ x 2½ inches	1	1	1			
Scoop, No. 2, 3⅝ x 2⅞ inches	1	1	1			
Scoop, No. 3, 4⅜ x 3¼ inches	1	1	1			
Sieve, brass or copper wire cloth, 8 inch diam., No. 20	1	1	1			
Sieve, brass or copper wire cloth, 8 inch diam., No. 40	1	1	1			
Sieve, brass or copper wire cloth, 8 inch diam., No. 80	1	1	1			
Spatula, flexible steel blade, 3 inches	1	1	2			
Spatula, flexible steel blade, 4 inches	1	1	2			
Spatula, flexible steel blade, 6 inches	1	1	2			
Spatula, flexible steel blade, 8 inches	1	1	2			
Spatula, hard rubber or composition blade, 6 inches	1	1	2			
Spatula, hard rubber or composition blade, 8 inches	1	1	2			
Support stand, iron rectangular base, 6 x 9 inches, rod 24 inches, with rings 3, 4, 5, 6 inches diameter	1	1	1			
Support, test tube, wood, 12 place	1	1	1			
Thermometer, general purpose, ASTM, (1C-39) -20° to +150° C.	1	1	1			
Thermometer, general purpose, ASTM, (2C-39) -5° to +300° C.	1	1	1			
Tripod, iron with rings, 9 inch height, 6 inches outside diam.	1	1	1			
Tube, test, chemical ..	12	12	24			
Water bath, round, copper with rings, 6 inch diam.	1	1	1			
Wire gauze, asbestos center, 6 inch sq.	1	1	1			

Standards For

PRESCRIPTION CONTAINERS

by George F. Archambault

How should prescriptions be dispersed? In cardboard boxes? In tin containers? In paper envelopes? In plastic containers or in glass containers? What, if any, requirements should the practicing pharmacist require for prescription containers?

For years, the writer has been unfavorably impressed by the seeming lack of any standardization for prescription containers. For example, in clinics, hospitals, and in drugstores, it is not uncommon to see containers reused as prescription containers; to see paper boxes and envelopes used for the dispensing of tablets and capsules; and to see water-colored glass containers used for the dispensing of medications, medications containing substances that official standards call for packaging in tight, light-resistant containers.

The conclusion that is to be drawn is more or

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less obvious—evidently little thought has been given in general by pharmacy schools, boards of pharmacy, and leaders in the field of practicing pharmacy at the drugstore or hospital level, to standards for prescription containers.

In attempting to find a simple, practical solution to the prescription container problem, the first question that presents itself to the thinking pharmacist is, again, one of standards—just what constitutes a valid prescription container? The answer, obviously, is any container that will give to the consumer *at the time of consumption,* medication in as high a state of preservation as possible.

Obviously, such factors as containers should be moisture and air-tight, of a composition of inactive material, sturdy, and capable of excluding actinic rays, when necessary, are of first importance in setting requirements or standards for prescription containers; then should follow such factors as economy and availability; and, finally, professional appearance, non-tip base, pouring lip, shape, and other convenience factors. The advertisements of glass prescription cantainer manufacturers use such terms as "protection from bathroom moisture" and "light protected" in emphasizing two of these major points.

AN APPROACH TO THE PROBLEM

In October 1949, the Pharmacy Branch of the Division of Hospitals of the U. S. Public Health Service became concerned with this problem in its attempt to standardize the prescription containers used in its activities. The objective of the Branch was to standardize prescription containers, so as to insure to the beneficiaries of the Service the receiving of medications, and the keeping of medication *until consumed,* in as high a state of potency as possible.

For the purpose of this study, it is our opinion that the best authorities available on preservation and storage factors of medications are the monographs found in the *Pharmacopoeia of the United States* and the *National Formulary,* the standards used by Federal and State food and drug authorities in exercising vigilance over such items in the interest of sound public health. These authorities direct that many of the official medications be packaged, stored, and preserved in tight, light-resistant containers.

The *U.S.P. XIV* and the *N.F. IX* have, as have their predecessors, general notices on light resistant containers:

"*Light-resistant Container*—A light-resistant container is a container which is opaque, or designed to prevent photochemical deterioration of the contents beyond the official limits of strength, quality, or purity, under the ordinary or customary conditions of handling, shipment, storage, or sale. A container of colorless glass is also light-resistant if it is enclosed in a covering impervious to light.

Unless otherwise directed, a light-resistant container shall be composed of a substance which in a thickness of 2 mm. shall not transmit more than 10 percent of the incident radiation of any wave length between 2900 and 4500 Angstroms, page 694. If the walls of a container are less than 2 mm. in thickness, the same 10 percent limit of light transmission shall apply.

The Pharmacopoeial requirement for the use of light-resistant containers does not apply to these products when dispensed by the pharmacist unless so indicated in the individual monograph."

It will be noted that the last paragraph reads "The Pharmacopoeial requirement for the use of light-resistant containers does not apply to these products when dispensed by the pharmacist unless so indicated in the individual monograph." A paragraph of similar import will be found in the ninth edition of the *National Formulary* on page 7. Whether this means what it says or not, I do not know; that is, that the *Pharmacopoeia* and the *National Formulary* standards for light-resistant containers do *not* apply when items involved are dispensed by a practicing pharmacist, and, therefore, by implication, all the other factors regarding packaging, storage and preservation requirements *do apply.* To the dispensing pharmacist, I assume it does. Why this one point is expressly exempted, I do not know. The fact remains, however, that the official requirement for light-resistant containers has been expressly excluded in reference to items *dispensed by pharmacists* "unless indicated in the individual monograph."

PARADOXICAL SITUATION

Practicing pharmacists, then, find themselves confronted with this odd situation; item "x" is received from the manufacturer in a container meeting the official requirements of airtight and light-resistant then, because the item becomes a prescription, no standards prevail for light-resistant packaging and the pharmacist can do as he pleases.

One interpretation given to the writer was to the effect that medications dispensed on prescriptions are, or should be, consumed in relatively short periods of time and, therefore, no prescription container standards are necessary on this point. In my opinion, this answer belabors the point and solves nothing. Either light-resistant container protection is needed or it is not needed. If needed, then assuredly it is needed completely along the line from the original source of supply to the point of consumption.

Another comment given by an authority in chemistry as a reason why light-resistant containers need not be required for prescriptions is: "There are so many official substances for which light-resistant containers are required that, with the infinite number of permutations and combinations of drugs prescribed, it would seem that almost the only alternative would be to use dark amber bottles always . . . this is not practicable," the commentator states, "and negates the pharmacists' attempt to prepare elegant preparations and makes it difficult to see rather obvious spoilage."

The same authority also points out "that dark bottles are made so by the use of iron and that since such bottles are always subject to a certain degree of attack, it may be possible that enough iron will be extracted to catalyze destruction of some drugs which are heavy-metal sensitive." Again, I feel nothing is solved by such an explanation when, in effect, the only point being questioned is the use of light-resistant containers for prescription dispensing. It hardly seems that these objections are valid, if the same containers are good practice in the pharmaceutical manufacturing industry. They too, are concerned with producing elegant preparations, detecting spoilage, and the problems of iron reactions.

Further, while it is agreed that medications for ward, clinic and outpatient use are normally consumed in relatively short periods of time after being dispensed by a pharmacy, the fact remains and studies prove that many such medications have a long "shelf life" after being prepackaged into prescription containers by many hospital and clinic pharmacies and outpatient offices. This is also true of prescriptions dispensed by the practicing pharmacists in the 60,000 pharmacies of the country. Many such preparations are called back into use by families long after the intended period of use has passed. How many of us have heard physicians tell patients that they can take a prescription previously prescribed, when the patient still has a supply at home. Must not the pharmacist, in living up to the codes of his profession, be concerned with maintaining full therapeutic effectiveness of the medications he dispenses in such instances?

PHARMACY'S RESPONSIBILITY

It is our opinion that, as long as the *U.S.P.* and the *N.F.* find the need for requiring certain standards for the containers of certain items, similar standards should prevail for containers of such items through to the ultimate consumer. Possibly the solution to this problem is for the *U.S.P.* and the *N.F.* to concern themselves with over-all standards for prescription containers. This is a matter for their legal authorities to determine and for us to urge, if we feel this to be the correct solution to the problem.

Many pharmacists who have given thought to the problem are of the opinion that an obligation also rests upon pharmacy to properly instruct and guide its members, especially those in the dispensing area, as to what constitutes proper prescription containers, in order that the public will be protected and that dispensed medications will receive a degree of protection equal to that prescribed by the official compendia for official substances prior to their becoming prescriptions.

RECOMMENDATIONS

The Pharmacy Branch of the Division of Hospitals of the Public Health Service has, therefore, taken the position that, in the light of available evidence, an amber-colored glass prescription container service best meets, among the commercially available prescription containers, the light-resistant and other requirements of the *U.S.P.* and the *N.F.*, and we have, therefore, adopted this type of container.

Our reasoning for this decision might be summed up as follows:

1. The *U.S.P.* and the *N.F.* require that many official substances be packaged, stored, and preserved in airtight, light-resistant containers.

2. Pharmaceuticals manufacturers must follow this procedure as it involves official substances requiring this protection.

3. In standardizing, economy dictates that no duplication be had in sizes and styles, if at all possible, i.e., it is not practicable to stock 120 cc colorless bottles and 120 cc amber bottles and two types of all other containers, one amber and one colorless.

4. Amber-colored containers are easily available.

5. Amber-colored containers are in a competitive price field with other glass prescription container services.

6. The *U.S.P.* and the *N.F.* are specific in their requirements for light resistance in containers when they state that in a thickness of 2 mm. the glass shall not transmit over 10 percent of the light between 2900 and 4500 Angstrom units (290 to 450 millimicrons). The amber-colored prescription container service meets these requirements (see Sharp's articles reported in *Glass Industry Journal 23*: 331 and 380 (Sept. and Oct.) 1947). We have been unable to find satisfactory evidence of other available glass-colored or uncolored prescription container service meeting these requirements.

7. We strongly believe that pharmacists have a responsibility to see that the physician's or dentist's prescription is compounded and *dispensed* in such a manner that it does not deteriorate for as long a period as possible, *not* for as long a period for which the prescription is intended if consumed according to direction; and

8. Hospital and clinic pharmacists have in many instances, as part and parcel of their ordinary and customary duties, *the prepackaging of medications* into individual prescription sizes. These pharmacists bear an additional responsibility not unlike the manufacturers', for the stability of the product packaged.

In conclusion, therefore, we feel that, in setting up prescription container standards, we could do no less than to subscribe to the standards laid down by the *U.S.P.* and the *N.F.* for the packaging, storage, and preservation of its labile items, standards which guarantee a basically sound prescription dispensing service, inasmuch as it meets all dispensing needs, prevents duplication of inventory, and remains in the competitive glass prescription container service field.

University Place entrance to the Roosevelt Hotel in New Orleans

7th INSTITUTE

on Hospital Pharmacy

NEW ORLEANS

June 11th to 15th

Charity Hospital

The Seventh Institute on Hospital Pharmacy will be held at the Roosevelt Hotel in New Orleans from June 11 to 15 inclusive. The Institute is sponsored by the American Hospital Association, the American Pharmaceutical Association, the American Society of Hospital Pharmacists, the Southeastern Society of Hospital Pharmacists and the Louisiana Society of Hospital Pharmacists. Its purpose is to present a refresher course on the several facets of the practice of hospital pharmacy.

Applicants must be a pharmacist in a hospital that is an institutional member of the American Hospital Association, or a personal member of the American Pharmaceutical Association and the American Society of Hospital Pharmacists. Certificates of attendance will be presented by the sponsoring organizations to enrollees who attend all sessions.

All meetings of the Institute will be held in the Roosevelt Hotel which is located in the heart of New Orleans. The tuition fee is $35.00, payable to the American Hospital Association. Living accommodations may be had at the Roosevelt Hotel where the American Hospital Association will make reservations for double rooms with twin beds.

The program has been planned to include lectures and discussions on the several aspects of hospital pharmacy including administration, organization, planning, manufacturing, dispensing, and the relation of the pharmacy department to other hospital units. The program and faculty are listed on the following pages.

New Orleans:
St. Louis cathedral in center with State museum and Cabildo on either side and the Upper Pontalbo building to extreme left. Park in front is Jackson Square.

THE FACULTY

ARCHAMBAULT, GEORGE F., chief, Pharmacy Branch, Division of Hospitals, U. S. Public Health Service, Washington, D.C.

ARMBRUSTER, VALERIE, chief pharmacist, Charity Hospital, New Orleans.

BARNETT, CHARLES B., chief pharmacist, St. Luke's Hospital, Jacksonville, Fla.

BOWLES, GROVER C., chief pharmacist, Strong Memorial Hospital, Rochester, N. Y.

BURNS, ROLAND, M.D., chief resident, Touro Infirmary, New Orleans.

CATHCART, J. ROBERT, chief pharmacist, Delaware Hospital, Wilmington.

DODD, William J., lieutenant governor of Louisiana, Executive Department, State Capitol, Baton Rouge.

FISCHELIS, ROBERT P., Sc.D., secretary, American Pharmaceutical Association, Washington, D.C.

FLACK, HERBERT L., chief pharmacist, Jefferson Medical College Hospital, Philadelphia.

FRANCKE, DON E., chief pharmacist, University Hospital, Ann Arbor, Mich.

FRAZIER, WALTER, chief pharmacist, Springfield City Hospital, Springfield, Ohio.

FREEDMAN, DAVID A., M.D., fellow in psychiatry and neurology, Louisiana State University School of Medicine, New Orleans.

GILBERT, NORMAN S., M.D., assistant professor of pharmacology, Louisiana State University School of Medicine, New Orleans.

GOUDY, LEONARD P., secretary, Council on Administrative Practice, American Hospital Association, Chicago.

GRONER, FRANK, administrator, Baptist Hospital, Memphis.

HINSLEY, JOSEPH C., assistant administrator, Touro Infirmary, New Orleans.

LAUVE, ALBERT P., chief pharmacist, Mercy Hospital, New Orleans.

McKENZIE, JOHN C., M.D., director, Touro Infirmary, New Orleans.

MILNE, ALEXANDER M., Division of Hospital Facilities, U. S. Public Health Service, Washington, D.C.

MONTE, LOUIS, A., M.D., professor of clinical medicine, Louisiana State University School of Medicine, New Orleans.

NIEMEYER, GLORIA, assistant director, Division of Hospital Pharmacy, Washington, D.C.

O'BRIEN, WILLIAM P., chief pharmacist, Touro Infirmary, New Orleans.

PHILLIPS, GEORGE L., assistant chief pharmacist, University Hospital, Ann Arbor, Mich.

PRICE, MRS. LILLIAN, chief pharmacist, Emory University Hospital, Atlanta.

PULLEN, ROSCOE L., M.D., vice-dean, Tulane University School of Medicine, New Orleans.

PURDUM, W. ARTHUR, chief pharmacist, Johns Hopkins Hospital, Baltimore.

REAMER, I. THOMAS, chief pharmacist, Duke Hospital, Durham, N. C.

SEGELOFF, ALBERT, M.D., director of endocrine research, Alton Ochsner Medical Foundation, New Orleans.

SHIELDS, REV. THOMAS J., S.J., president, Loyola University, New Orleans.

VANCE, C. JOSEPH, assistant administrator and chief pharmacist, South Highland Infirmary, Birmingham.

WALKER, ARTHUR J., M.D., associate professor of tropical diseases, New Orleans.

WHITNEY, HARVEY A. K., chief pharmacist, Receiving Hospital, Detroit.

MONDAY, JUNE 11

Hospital Pharmacy Organization

ROBERT P. FISCHELIS, *Presiding*

8:00— 9:00 A.M. Registration

9:00— 9:30 A.M. Greetings to the Institute from:
American Hospital Association LEONARD P. GOUDY
American Pharmaceutical Association ROBERT P. FISCHELIS
American Society of Hospital Pharmacists I. THOMAS REAMER
Southeastern Society of Hospital Pharmacists LILLIAN PRICE
Louisiana Society of Hospital Pharmacists VALERIE ARMBRUSTER

9:30—10:30 A.M. Basic Principles of Organization FATHER SHIELDS

10:30—11:30 A.M. Basic Principles of Administration and Organization of a Hospital FRANK GRONER

1:30— 2:10 P.M. Factors in the Establishment Of a Manufacturing Policy HARVEY A. K. WHITNEY

2:10— 2:50 P.M. Basic Factors in the Formulation of Policy for the Pharmacy and Therapeutics Committee DON E. FRANCKE

2:50— 3:30 P.M. Considerations in the Establishment of a Pricing Policy for Pharmaceuticals C. J. VANCE

3:45— 4:25 P.M. Basic Policies of Departmental Relationships C . J. HINSLEY

4:25— 5:00 P.M. Basic Policies in Purchasing Pharmaceuticals ALBERT LAUVE

7:30 P.M. Social Evening—Sponsored by the Louisiana Society of Hospital Pharmacists.

TUESDAY JUNE 12

Hospital Pharmacy Administration

ALBERT LAUVE, *Presiding*

8:30— 9:30 A.M. Steps in Planning the Physical Layout and Equipment of the Hospital Pharmacy ALEXANDER J. MILNE

9:30—10:30 A.M. Pharmacy Management —Integration of Functions with Routine of Other Departments WALTER FRAZIER

10:30—11:30 A.M. Essential Business Records for the Pharmacy C. J. VANCE

1:30— 2:30 P.M. Pharmacy Records— Their Purpose, Uses and Types GEORGE ARCHAMBAULT

2:30— 3:30 P.M. Economics of Manufacturing in a 100 Bed Hospital J. ROBERT CATHCART

3:30— 4:30 P.M. Steps in the Development of a Formulary in a Small Open Staff Hospital CHARLES B. BARNETT

WEDNESDAY, JUNE 13

Current Trends in Pharmacology and Therapeutics
To Be Announced, *Presiding*

8:30— 9:20 A.M. Electrolytic Ion Replacement Therapy — Roland Burns

9:20— 9:40 A.M. Preparation of Electrolytic Solutions — William P. O'Brien

9:40—10:20 A.M. A Survey of New Drugs Used in the Treatment of Tuberculosis — Louis A. Monte

10:40—11:20 A.M. Recent Developments in the Treatment of Parasitic Diseases — Arthur J. Walker

1:30— 2:20 P.M. Recent Developments in Endocrine Drugs — Albert Segaloff

1:30— 2:30 P.M. Formulas and Procedures for the Preparation of Injectable Medications — George L. Phillips

2:30— 3:30 P.M. Useful Formulas and Procedures for Pharmaceutical Preparations — Herbert J. Flack

3:30— 4:30 P.M. Formulas, Procedures, and Precautions for Preparations Containing Antibiotics and Sulfonamides — Arthur Purdum

4:30— 5:30 P.M. Formulas and Procedures for the Preparation of Stains and Reagents — Grover C. Bowles

7:30 P.M. Panel Discussion

FRIDAY, JUNE 15

Workshop
Leonard P. Goudy, *Presiding*

8:30—11:30 A.M. Problems in Hospital Pharmacy

Group 1—Outpatient Pharmacy Charges for Drugs
Leader I. Thomas Reamer

Group 2—Problems of Pharmacists in Government Service
Leader E. Burns Geiger

Group 3—After Hour and Emergency Requests for Drugs
Leader Don E. Francke

Group 4—Narcotic and Barbiturate Control Problems
Leader Arthur Purdum

Group 5—Refilling Prescriptions in the Outpatient Department
Leader Gloria Niemeyer

Group 6—Teaching Activities
Leader Herbert L. Flack

12:00 Noon Luncheon
Current Trends in Pharmaceutical Education with Special Emphasis on Hospital Pharmacy — Roscoe L. Pullen

1:30 P.M. Summaries of the discussion and decisions reached in the morning workshop groups.

6:00 P.M. Dinner
Award of Certificates — John C. McKenzie

SEVENTH INSTITUTE PROGRAM

2:20— 3:10 P.M. Current Investigational Drugs — To Be Announced

3:10— 4:00 P.M. Survey of Drugs Used in the Treatment of Epilepsy — David Freedman

4:00— 4:50 P.M. Newer Autonomic Drugs — Norman S. Gilbert

7:00 P.M. Dutch Dinner
Speaker To Be Announced

THURSDAY, JUNE 14

Pharmaceutical Aspects of Production of Currently Important Drugs

I. Thomas Reamer, *Presiding*

8:30— 9:30 A.M. Planning and Equipping a Sterile Solutions Room or Laboratory — Alexander J. Milne

9:30—10:30 A.M. Theoretical and Practical Considerations Involved in the Preparation of Parenteral Medications — George L. Phillips

10:30—11:30 A.M. Survey of Useful Manufacturing Equipment for the Hospital Pharmacy — Arthur Purdum

minimum standards and the future

by W. ARTHUR PURDUM

Hospital pharmacy has made great progress since Harvey Whitney became the first chairman of the American Society of Hospital Pharmacists a relatively few years ago—greater progress, in fact, than any other specialized branch of our profession. To cite tangible evidence of the growing interest in and respect for our specialty, I mention the creation of the Division of Hospital Pharmacy by the American Pharmaceutical Association with a $10,000 budget for its first year of operation, the recent introduction of undergraduate and graduate courses in hospital pharmacy by a number of our universities, and only last week the recognition by the United States Pharmacopeial Convention of a delegate from the American Society of Hospital Pharmacists at future conventions.

In large measure, this progress parallels the remarkable growth of the ASHP. The underlying reason for such rapid development was the adoption of fundamentally sound objectives for the Society and the fulfillment of them. What are the principal objectives and how are they being achieved? We are pledged to improve and extend the usefulness of the hospital pharmacist to the patient, to the hospital, to members of the allied health professions and to the profession of pharmacy; to assist in providing for the future an adequate supply of qualified hospital pharmacists; and to promote the dissemination of pharmaceutical knowledge.

This latter objective, that is, the interchange of information is already developed to a high degree. This is taken care of in part by the information service offered by the Division of Hospital Pharmacy in Washington and is available to all pharmacists. Another medium is the well established annual institute on hospital pharmacy which originated in Ann Arbor less than five years ago. Last but certainly our most potent medium is our Bulletin. Much credit is due Don Francke for this fine publication and while numerous bouquets have been tossed in his direction in the past, the most recent compliment is the eagerness of large manufacturers to advertise in this journal.

Hospital standardization was born in 1918 and the proud parents are the American College of Surgeons. Its object is to foster better hospital care in all its phases, and the results obtained far more than justify the effort expended. In that year, 692 hospitals of 100 or more beds were surveyed and only 12.9 per cent were approved. By 1926 the figure was well above 90 percent of those inspected and has been climbing steadily toward perfection since that time.

Not until 1935, at the suggestion of Dr. Malcolm T. MacEachern, former director of the A.C.S., was a standard written for the hospital pharmacy. This was prepared by Edward Spease, at that time dean of the Western Reserve University School of Pharmacy, and the only man other than Harvey Whitney who holds honorary membership in the ASHP. He was assisted by Robert M. Porter, then chief pharmacist at the University Hospitals of Cleveland. The standard was adopted very soon thereafter by the A.C.S. and is still recognized today by that body. It was an excellent standard in 1935 but pharmaceutical

Presented as the Harvey A. K. Whitney Lecture before the Michigan Society of Hospital Pharmacists in Detroit, May 18, 1950. This award, established in honor of the first chairman of the American Society of Hospital Pharmacists, is presented annually to the person who has made the most outstanding contribution to hospital pharmacy.

The selection of Dr. Purdum was made in recognition of his contributions during his term as president of the American Society of Hospital Pharmacists, his work as chairman of the Committee on Minimum Standards, for his initiative in establishing the first combined graduate-internship program in hospital pharmacy, and for his accomplishments as chief at Johns Hopkins Hospital.

practice has changed in fifteen years and there is definite need for a revised standard today. We now have this new standard and all of you have had opportunity to read it in a recent issue of THE BULLETIN. In this standard lies the key to our first objective: improving and extending the usefulness of the hospital pharmacist.

In what respect is the new standard an improvement over that currently recognized by the American College of Surgeons? The old standard permits a hospital to obtain pharmaceutical service from a nearby drugstore whereas the new standard requires that "There shall be a properly organized pharmacy department under the direction of a professionally competent, legally qualified pharmacist . .". In the small hospital, pharmaceutical service from a nearby pharmacy no longer suffices. No longer shall a nurse be in charge of the "drug room". In fact, no longer shall there be a "drug room". Under the new standard, the drug room is being elevated to the plane of a pharmacy with a competent pharmacist in charge, even though his services may be on a part-time basis. He may be a nearby pharmacist or preferably a full-time hospital employee who has been assigned additional professional or administrative duties.

A chapter on policies, not appearing in the old standard, now vests in the pharmacist the authority to develop and carry out the administrative policies of the department. He shall also develop with the assistance of the Pharmacy and Therapeutics Committee, the professional policies of the department and he is responsible for their implementation. In keeping with good administrative practice, it is natural that all policies should secure the approval of the hospital administrator.

The section on personnel has been perhaps the most controversial of the entire standard. When it originally emerged from the committee at the time of the 1948 convention, it required that ". . . the chief pharmacist shall be a diplomate of 'a hospital pharmacy specialty board". (It was anticipated that these requirements would include graduate study leading to a M.S. or Ph.D. degree in pharmacy and the completion of a recognized hospital pharmacy internship.) It was soon quite obvious that the good intentions of the committee were misunderstood and not appreciated, to state the case mildly. We of the committee envisioned for the future a group of specialists in hospital pharmacy who had become fellows of the yet to be organized "American College of Hospital Pharmacists". This was incorrectly interpreted by a number of protestants as a squeeze play on the part of a few to form an exclusive fraternity. Actually, the statement was written into the standard by a committee member holding a three year degree and it received the blessing of another member who is a two year graduate. The committee's oversight was our failure to append a statement recognizing experience in lieu of advanced education. In its final form, this section requires that the department have an ample number of qualified personnel to furnish pharmaceutical service of the highest quality. Futhermore, steps have been taken to make secure the positions of those pharmacists who graduated during the days of the two and three year courses.

The chapter on facilities assures the pharmacist of adequate pharmaceutical and administrative equipment in a well-lighted and well-ventilated area in order to properly perform his many and varied duties.

The scope of the pharmacist's responsibilities has been expanded to a considerable degree. The old standard charged the pharmacist with supervision over eight specific functions whereas the new makes him responsible for fifteen. Among his added duties, he must maintain a pharmaceutical and therapeutic information service for the hospital staff, he must establish and maintain a satisfactory system of records, he should cooperate in the teaching of courses to student nurses and assist in the medical intern training program, and he should file periodic reports on the progress of the department with the hospital administrator.

The Pharmacy and Therapeutics Committee is an important and influential body in the operation of a hospital. The judicious selection of therapeutic and diagnostic materials plays a major role in patient care—not only is the patient's physical welfare affected but his pocketbook as well. The decisions of this committee also play a major role in the economical operation of the pharmacy. The responsibility of the committee with regard to professional policy was recognized in the old standard. However, the old standard also charged the committee with supervision over the purchase and issuance of all drugs and pharmaceutical supplies which function is purely administrative, and the new standard places this responsibility on the shoulders of the pharmacist in charge. A most important new requirement of the Pharmacy and Therapeutics Committee is that it develop a formulary of accepted drugs for use in the hospital.

Our other principal objective concerns our assistance in providing an adequate number of qualified hospital pharmacists for the future. We all appreciate that there is an acute shortage of well-trained personnel. What can be done to alleviate this shortage? Part of the answer lies in our colleges of pharmacy. The school not offering a course in hospital pharmacy should make one available to its students. The ASHP, through a special committee, has already written a syllabus and is now prepared to assist those colleges interested in inaugurating such a course. Where possible, the course should be taught by a practicing hospital pharmacist. This course is not expected to produce finished hospital pharmacists but it can serve the very useful purpose of stimulating the student's interest in our branch of pharmacy. After this interest has been aroused, the final solu-

tion to the problem lies in the creation of more training programs—programs which can qualify under the proposed *Minimum Standard for Pharmacy Internships in Hospitals*. This standard has undergone major revision since it was first published in THE BULLETIN approximately 18 months ago and the committee feels that we now have a satisfactory and workable standard. The revised version was presented to the Society at the time of the Atlantic City convention in 1950.

This standard recognizes two types of internships: non-academic and academic. Each consists of a minimum period of training of 1920 hours in the hospital pharmacy. In addition, the academic internship requires one year of graduate study leading to a M.S. degree. The minimum number of hours has been reduced from 2100 to 1920 at the request of pharmacists in government service so that the entire training period can be scheduled in one Federal work year of 48 weeks of 40 hours each. Because we are seeking to enlist the best people available, applicants must have a better than average scholastic standing, be of high moral character and in good health. The training hospital shall be a general hospital of at least 200 beds and shall have an active outpatient department. The minimum of 200 beds has been criticized as too high by a number of interested individuals. It was the consensus of opinion in the committee that smaller hospitals for the most part would not have adequate facilities to offer the broad training required for these trainees. The pharmacy department of the training hospital must comply with the requirements of the *Minimum Standard for Pharmacies in Hospitals* and shall include among its activities outpatient prescription service, dispensing to hospital divisions and inpatients, the manufacture of pharmaceuticals, and departmental administration.

The supplemental elaboration to the standard spells out many details not given in the basic standard itself and is intended to be a guide for pharmacists offering training programs and for examiners. Certain sections, no doubt, will be subject to criticism but no standard ever developed in the past or to be developed in the future will be completely satisfactory in the eyes of all concerned. It is almost a certainty that no pharmacy or training program exists that can earn a perfect score. Nevertheless, we must all strive for as high a rating as possible.

Even though we have come a long way during the short history of the ASHP, our forward movement must continue; there are still jobs to be done.

At the present time, the new standard for the hospital pharmacy carries the approval of the ASHP, the A.Ph.A. and the American Hospital Association. Before the end of this year we hope to receive the approval of the American Medical Association and the approval and adoption of the standard by the American College of Surgeons.

Speaking before a sectional meeting of the American College of Surgeons about a year ago, I found fault with the point rating system for hospitals on three counts. First, and of least significance, was the allocation of only 10 points to the pharmacy out of 1,000 for the hospital. Since then, pharmacy's points have been increased to 20. Of greater consequence was the fact that only three questions had to be answered satisfactorily to earn these points. No pharmacy can be evaluated properly on this basis and during the past year, several additional questions have been added. The questionnaire is still inadequate and another should be written based on the new minimum standard. My chief objection was that pharmacy is found among the adjunct and service divisions of the hospital rather than with the essential divisions where it should be. Today we are still recognized as a complementary service department and we must continue our efforts until pharmacy is regarded as essential.

I would like to see the standard for internships reviewed and approved by the Executive Committee of the Society at an early date and forwarded to the Division of Hospital Pharmacy with the recommendation that the Division undertake the responsibility for organizing the procedure of accreditation, and act as the accrediting body for hospitals offering such training. One tool needed by the Division to carry out this function will be a questionnaire or check list based on the standard and I hope that this can be accomplished in the near future. Those of us who offer training programs now must arrange to meet or exceed the requirements of the standard and it behooves all of you who can qualify and are not offering internships to initiate such programs as soon as possible.

Several months ago, Don Francke presented an excellent editorial in THE BULLETIN entitled "Needed—a Standard of Practice". While we now have an excellent minimum standard to control the board practice of pharmacy in hospitals, I concur with Editor Francke that a detailed standard of practice will prove of great value to the hospital pharmacist and I urge that such a standard be written.

As time passes, we will recognize our new standard as insufficient, revision will take place, and the level of our practice raised another rung on the ladder of progress. We should keep in mind the future creation of that specialty board, mention of which was withdrawn from the standard because of current opposition. Such a board will serve as an incentive to all of us to improve ourselves in order to earn what I hope will be a highly coveted diploma.

What will be the ultimate effects of these standards? While we are only one wheel in the hospital machine, through better pharmacists, better facilities, and better management, we can ex-

pect to render a more efficient and economical service to the hospital, to the other medical care professions, and above all to the patient.

A final consideration is the threat of compulsory national health insurance. Our public servants in Washington have made John Q. Public well aware of the high cost of medical care. The paying hospital patient is indignant over the high per diem cost of hospital care and it is true that these costs have risen considerably in recent years but he overlooks the important facts that advances in the pharmaceutical and medical sciences have substantially reduced the term of his stay in the hospital. He also overlooks the fact that he now pays $75 for a $35 suit of clothes and $1.50 for a $.60 cut of beef. I am opposed to the Federal program for the socialization of medical care and believe that we as pharmacists can assist in forestalling this dangerous enemy of free enterprise by doing all within our power to supply the highest type of pharmaceutical service at the lowest possible cost.

Compliance with the minimum standards will assist immeasurably in realizing these goals. We must not wait for an accrediting agency to require observance but rather, in the interest of immediate improvement in pharmaceutical service, we should begin our own program of self-enforcement and have our house in order before the inspector arrives at the door.

A splendid A.M.A. editorial
of high interest to all hospital pharmacists

Minimum Standard for Pharmacies in Hospitals

The object of hospital standardization, in all its phases, is to promote the care and welfare of the sick and to give to patients the full benefits of modern medical and hospital service. It is with this aim, also, that the American Pharmaceutical Association and the American Society of Hospital Pharmacists have recently prepared a minimum standard for hospital pharmacies, recognizing that better organization, planning and facilities will be necessary to permit them to keep pace with the many discoveries and advances that are now prominently associated with the application of drug therapy.

As stated by the sponsoring agencies, the development of the present standard is not an attempt to cast all hospital pharmacies into a single mold, for it is well recognized that each hospital must necessarily vary its methods, space and facilities to meet the needs of its own patients. Through these efforts, however, "there has been evolved a standard which, when properly interpreted in the light of the requirements of individual organizations, may serve as a set of fundamental principles on which to build more efficient and effective pharmaceutical service for hospitals."

The minimum standard has been carefully planned. It consists of six major divisions dealing with organization, policies, personnel, facilities, responsibilities and the pharmacy and therapeutics committee. The organizational section emphasizes the importance of establishing the department under the direction of a professionally competent and legally qualified pharmacist. Formulation of policies is considered a joint responsibility of the pharmacist, the hospital administrator and the pharmacy and therapeutics committee. The section on personnel concerns the educational qualifications of the pharmacist in charge as well as the additional personnel that may be required for departmental operation. Facilities include such items as adequate space for all departmental activities, refrigeration, storage of narcotics and other pharmaceuticals, bookkeeping, library and filing equipment. Specific information is given with respect to the duties and responsibilities of the hospital pharmacist. These include the preparation and sterilization of injectable medication when manufactured in the hospital, manufacture and dispensing of drugs and pharmaceutical preparations, filling and labeling of drug containers, inspection of pharmaceuticals on all services, maintenance of approved antidotes and other emergency drugs, dispensing of narcotics and alcohol, maintenance of inventories, establishment of controls and specifications for the purchase of drugs, cooperation in educational activities, formulation of policies in accordance with hospital regulations, maintenance of records and preparation of required reports. The organization of the pharmacy and therapeutics committee is described, as well as its functions in the formulation of policies, the development and revision of formularies of accepted drugs and the evaluation of clinical data pertaining to drugs and pharmaceuticals requested for hospital use.

As a further aid in the application of these requirements, the American Pharmaceutical Association and the American Society of Hospital Pharmacists have officially approved the suggested plans for hospital pharmacies prepared by the United States Public Health Service with respect to 50, 100 and 200 bed general hospitals. The detailed information supplied in the minimum standard as well as the suggested plans for hospitals of varying size will be found extremely helpful as organizational guides for all institutions seeking to develop a new hospital pharmacy or extend the work of an existing department.

Reprinted from the Journal of the American Medical Association, *145*:565, (February 24) 1951.

BOOK REVIEWS

HOSPITAL PURCHASING FILE. Edited by E. W. Jones. 800 pages, 8⅝" x 11¼". Published by Purchasing Files Incorporated, 919 Michigan Avenue, Chicago, 11. Twenty-eighth edition, 1951.

This book represents a composite of some 300 manufacturers' catalogs and is arranged in sixteen divisions for the purpose of facilitating purchasing of hospital supplies and equipment. The sixteen divisions follow closely the accepted practice of dividing the hospital into sixteen different departments, such as Pharmacy, Housekeeping, X-ray, etc.

It contains a cumulative index covering 1940 through 1950 which gives references for all editorial material which has appeared during the past ten years. Except for the progressive changes that take place constantly in all manufacturers' catalogs, it represents essentially the same information on supplies and equipment which has appeared in the preceding ten editions since 1940.

Of interest to the hospital pharmacist is the list of supplies and equipment suggested by the Division of Hospital Facilities of the U.S. Public Health Service and approved by the Division of Hospital Pharmacy of the American Pharmaceutical Association; that is to say, Plans 16, 17 and 18, Revised, and an alphabetical listing of equipment and supplies with suggested quantities for various sized hospitals.

Makers of equipment for hospital pharmacies advertise herein. Among these is the manufacturer of parenteral solution equipment by the Fenwal process. Also details and pictures showing the Schwartz system of drug cabinets and fixtures appears.

The book should be useful to the new administrator and the new pharmacist who are equipping and supplying the new hospital. Too often these days we are finding that equipment and supply lists for new hospitals are being prepared by salesmen for the various companies, whose primary interest is the selling of their own equipment. A conscientious administrator or pharmacist will find this invaluable in making up their own lists.

C. JOSEPH VANCE

South Highlands Infirmary
Birmingham, Alabama

THE MERCK MANUAL OF DIAGNOSIS AND THERAPY. Eighth edition. Edited by An Editorial Board and staff of twelve physicians. Published by Merck & Company, Inc., Rahway, New Jersey. First printing May, 1950, Second Printing August, 1950. 1592 pages. Price $5.00.

This is a completely new handbook, not a revision of previous editions. It is dedicated to the doctor of medicine and to his colleagues and aides in the allied professions and is a source of ready reference. More than one hundred clinicians, throughout the country, have assisted the editorial board. The advise of these outstanding men has insured that the facts presented are complete, authentic and as recent as possible. The outstanding advances in medical research and practice of recent years have been included in this new Merck Manual.

Part I is devoted to diseases and major symptoms, and contains 338 chapters as compared to 256 in the Seventh Edition published in 1940. Among the new or expanded chapters are those on antibiotic therapy and of treatment with adrenocortical steroids, prenatal and postnatal care, tropical diseases, summaries of anticoagulant therapy, sulfonamide therapy, drug addiction, nutritional deficiencies, and mental emergencies.

The continuity of science cannot be interrupted with impunity. It is apparent that it has not been. We find that Part I of the Seventh Edition contains only therapeutic indications: etiology; diagnosis; laboratory tests; therapy, including prophylaxis and general regimen; reference to prescriptions by serial numbers in the text and metric system equivalents.

Part II presents completely new chapters on routing immunization measures, an outline of preoperative and postoperative care, a section on diets, clinical and bedside procedures, laboratory tests practicable for the doctor's office, helpful ready reference data, and conversion tables.

Dosage is included following the condition or disease in the Eighth while in the Seventh Edition, Part III is completely devoted to dosages. Part I in the Eighth Edition also includes the synonyms, chemical constituents, actions, uses, average doses, incompatibilities, and antidotes which are found under Part IV, Materia Medica, in the Seventh.

A useful miscellany is found at the end of Part II in the Eighth which constitutes Part V of the Seventh Edition.

Part III of the new edition contains an index, which has been expanded, evidenced by twelve additional pages, and is liberally cross titled. This proves a time saving device when information is needed. Despite the fact that the Seventh has six divisions and the Eighth has but three divisions, it is seen at a glance that the improvement is phenomenal.

Many chapters contain helpful tables, those on cardiac arrhythmias and cardiac blocks are illustrated by the typical ECG tracings. Each page headline indicates the page number, the section title and the subject matter on that page. A list of standard and special abbreviations used appears in the front of the book. Prescriptions are grouped into categories, according to therapeutic action, at

the end of each section. Dosage is in metric quantities throughout, as the metric system is the official one. Medical emergencies, such as drowning, burns, poisoning, venomous bites, electric shock, infusion reactions, and the like, are dealt with in chapters bearing these titles in the Physical and Chemical section.

The Merck Manual, Eighth Edition, should increase the armamentarium of the physician, pharmacist, and nurse, because of the rapid advances made in the practice of medicine. The progress made in the last decade is vividly portrayed when comparing the Eighth Edition with the Seventh. It is apparent that the search for intellectual integrity has not been in vain and that there has been no moratorium on research. The Divine Scientist must be pleased at the efforts made in the accumulation of facts and principles that can be used in the treatment of disease and the preservation of the health of our fellow man.

SISTER MARY JOHN, R.S.M.

Mercy Hospital
Toledo, Ohio

UNITED STATES DISPENSATORY. Edited by Arthur Osol, Ph.D. and George E. Farrar, Jr., M.D. 2057 pages, 7" x 10¼". Published by J. B. Lippincott Company, Philadelphia, Pa., 1950. Price $25.00

Among the contributors to this book down through the years are many names outstanding in the pharmaceutical profession and allied sciences. The *United States Dispensatory* is a standard pharmaceutical and medical reference which has long maintained an unexcelled reputation as a source of information about drugs. To those who have kept this 117 year old pharmaceutical tradition current with the rapid progress of research in the field of medicinals, the profession must surely owe a debt of gratitude.

This 1950 edition extends the 24th edition (1947) to include the new drugs in the *United States Pharmacopoeia* (14th Revision), the *Pharmacopoeia of Great Britain* (1948) and the *National Formulary* (9th Edition) which have not previously been official. A section on new drugs which are not included in the above official compendia has also been added. The book is divided into two volumes, the first including the material from the 24th edition and the second containing the drugs which have become official since 1947 as well as a number of unofficial drugs which have come into use recently such as ACTH, cortisone, and a number of antihistamines. Although a separate index for each volume is somewhat inconvenient, the two volumes are cross referenced, both in the indices and the monographs.

The work continues to be one of the most useful pharmaceutical reference books available by virtue of the scope and extent of specific information. Each monograph, insofar as applicable for both official and unofficial drugs, gives the official title, synonyms and abbreviations; official definition; unofficial synonyms, foreign language titles, tradenames and trade-marks; source or manufacturing process, and history. Also included are the official description, tests, assay methods, constituents, and adulterants; therapeutic uses, toxicology, dosage, storage directions and official preparations. The book also contains the general tests, processes, reagents, solutions and tables of the *United States Pharmacopoeia* and the *National Formulary*, plus a veterinary section which should be particularly useful to retail pharmacists.

The sections on unofficial drugs are particularly useful since they contain everything from the latest antibiotic to many rare drugs. The monograph on ACTH is particularly noteworthy. These drugs are often under such broad classifications as solvents and synthesis intermediates, local anesthetics, and mercurial antiseptics, which are in turn elaborated. The references, included in the text instead of at the end of each chapter, are exhaustive enough to lend their usefulness to almost any professional interest. The purpose of furnishing all the information a physician or pharmacist may need concerning drugs is well accomplished.

The book comprises an almost exhaustive drug encyclopedia and its usefulness dictates its presence among the reference works of any pharmacist, regardless of his professional specialty.

PAUL PARKER

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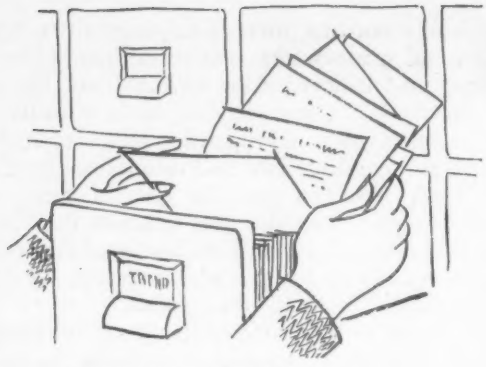
MAGIC KEY TO HOSPITAL LITERATURE. Revised Edition. 71 pages. 5½" x 8½". Published by the American Hospital Association, 1950. Available to association members.

A new enlarged edition of "The Magic Key to Hospital Literature" has been revised. Intended to serve as a guide to use of the American Hospital Association's Library, this booklet can be helpful to anyone interested, or in need of hospital literature. Pharmacists will find a list of headings under "Hospitals—Pharmacy Department" which could readily be useful as a guide to filing literature on hospital pharmacy. Whether or not such a list is adequate would depend upon the extent of the hospital pharmacy's reference service. The complete list of subject headings along with a selected list of books in the library, classified according to subjects, is indicative of the vast supply of information available from the A.H.A. on loan to association members.

Included in the introduction is a general statement on the material available, how the material is distributed, who may use it and how to use it. The American Hospital Association is to be commended on its library service and hospital pharmacists are urged to take advantage of it.

GLORIA NIEMEYER

American Pharmaceutical Association
Washington, D. C.



THERAPEUTIC TRENDS

New trends in medicine and pharmacy include SODIUM HEXADECYL SULFATE — ETHAVERINE — DEP — GELFOAM AND THROMBIN — HEXAMETHONIUM BROMIDE — ASTEROL DIHYDROCHLORIDE — PARITOL — NEW CHOLECYSTROGRAPHIC MEDIUM.

Sodium Hexadecyl Sulfate

Sodium hexadecyl sulfate to treat chronic ulcerative colitis is reported in *Gastroenterology 15*:426 (July) 1950. The aklyl sulfates are known to be effective inhibitors of lysozyme *in vitro,* and since lysozyme is assumed to be casually connected with irritation of ulcerations in ulcerative colitis, it was felt that this therapy might prove beneficial.

Early experiments show that inhibition of lysozyme by alkyl sulfates increased in general with increasing chain length from C_8 to C_{16}. A number of other detergents were tried but in the concentrations tested, they were at most less than half as effective as hexadecyl sulfate. Samples of the compounds for the studies were supplied by DuPont.

In the clinical studies, sodium hexadecyl sulfate was used to treat 18 patients with chronic ulcerative colitis (with 20 hospital admissions). Twelve remissions, six improvements and two failures were observed. It was noted that this compound showed a definite ability to effect mucosal healing. Under its influence the colonic mucus becomes distinctly more abundant and coats the mucosa more adequately. Nausea, epigastric burning, and watery diarrhea are unfortunate side effects of its administration. No apparent systemic toxicity was noted in any patient. Adaptation occurs with a concomitant lessening of these symptoms. The time necessary to achieve improvement or remission varied from one to nine weeks. These results seem to warrant further clinical trials of sodium hexadecyl sulfate, as well as other lysozyme inhibitors to treat chronic ulcerative colitis.

Ethaverine

Ethaverine, the ethyl analog of papaverine has been used experimentally in coronary disease. According to early work, it is claimed to be two to four times as potent a spasmolytic agent as the parent drug. A study to determine its coronary vascular action appears in the *J. Pharmacol. Exper. Therap. 100*:482 (Dec.) 1950. Comparing its action with that of papaverine, it was found that ethaverine had both a more gradual and a more persistently effective action at suprathresold dosage. Because of the fact that the action of ethaverine is more durable, the authors conclude that it is more effective in total effect summed over time.

Ethaverine is also known as Perparin and Diquinol, the latter which is the tradename of Parke, Davis and Company. The chemical name is 6,7-diethoxy-1-(3,4-diethoxy-benzyl) isoquinoline.

D. E. P.

Effect of a new anticonvulsant related to Mephenesin is reported in *J. Pharmacol. Exper. Therap. 100*:316 (Nov.) 1950. Chemically, it is 2,2-diethyl-1,3-propanediol. Studies of the action of DEP as an anticonvulsant against Metrazol, strychnine and electric shock were made on animals. DEP was found to exert a selective depression on multisynaptic neurone arcs in the spinal cord when its action on cord reflexes was studied.

DEP for investigational use was supplied by E. R. Squibb under the tradename Prendiol.

Gelfoam and Thrombin

Use of Gelfoam and thrombin in 27 cases of massive gastric hemorrhage proved effective in bringing about recovery of all patients without surgery. These agents were used in conjunction with regular therapy. Although it is difficult to evaluate hemostatic agents, the fact that all patients recovered without surgery is significant. It is also noted that in addition to this study which appeared in the *Am. J. Surg. 80*:883 (Dec.) 1950, therapy with Gelfoam and thrombin was used on 46 other cases with success.

Since well over 75 percent of the patients admitted with massive gastroduodenal bleeding present an obvious diagnosis of gastroduodenal ulcer, Gelfoam and thrombin were used to treat these cases. Two tablespoons of Gelfoam, prepared as a fine, dry, very light powder, are mixed with two ounces of milk and cream and given to the patient orally every two hours. Immediately following this the patient is given 250 units (50 cc.) of thrombin solution prepared by dissolving 1,000 units of thrombin in 200 cc. of water. Amphojel is used in conjunction with this therapy to neutralize the acidity and prevent the action of the pepsin in the digestion of the blood clot to

be formed over the ulcerative area.

If a diagnosis of bleeding from esophageal varices is made, Gelfoam powder is given in its dry state and is then followed by thrombin solution. The dry Gelfoam coats the esophagus in its downward passage.

Hexamethonium Bromide

Hexamethonium Bromide (C6), a new ganglionic blocking agent, may be useful in the clinical evaluation of the sympathetic vasoconstrictor component in cases of peripheral vascular disease, as well as in the treatment of acute peripheral vascular disorders associated with neurogenic vasospasm. This preliminary evaluation of hexamethonium bromide in man is published in *Circulation 2*:828 (Dec.) 1950. Supplies of the drug for this study were made available from Squibb Institute for Medical Research.

Hexamethonium bromide was administered in doses of 50 mg. intravenously to a heterogeneous group of 55 individuals including normal subjects and patients with various diseases of the vascular system. When injected intravenously the duration of action of the drug was one to two hours. It was effective by all routes of parenteral administration but was inactive after oral or sublingual administration. Patients were observed and it was noted that there were marked increases in digital blood flow and skin temperature without inhibition of digital reflexes. The increase in skin temperature was greater and more lasting than that following administration of Priscoline and tetraethyl ammonium chloride. Except for severe postural hypotension, side effects were minimal.

Asterol Dihydrochloride

Results of using a new fungistatic agent known as Asterol dihydrochloride show that almost all of 500 patients treated with the new drug responded favorably. A series of articles outlining the early investigational work and clinical trials appear in the *Trans. N. Y. Acad. Sci.* (Nov.) 1950. Chemically, Asterol is the dihydrochloride of 2-dimethylamino-6-(beta-diethylamino-ethoxy)-benzothiazol.

Asterol was used to treat fungus infections of the scalp, the nails and the smooth skin, including athlete's foot. In a group of 83 patients having tinea capitis, 95.2 percent of those treated were either cured or showed significant improvement. The drug was used as an ointment, a tincture and as a dusting powder, all in concentrations of two percent. Early tests show that Asterol in concentrations of two to five percent is not an irritant; however, it has been shown that in a ten percent concentration, it is a primary irritant. In fungus infections of the smooth skin and of the nails, a five percent concentration of Asterol produced either cure or significant improvement in 94.6 percent of 149 cases.

Five percent Asterol dihydrochloride is also useful in the treatment of the following superficial fungus infections: tinea carporis, tinea cruris, tinea pedis, tinea versicolor, paronychia caused by *Candida albicans,* and erosi interdigitalis blastomycetia. Monilial infections and tinea versicola respond more favorably than to other medications.

Asterol dihydrochloride was developed by Hoffman-La Roche, Inc. and is now available in the form of a tincture, an ointment and a dusting powder.

Paritol

Paritol, a polysulfuric acid ester of polyanhydromannuronic acid, is a new rapidly acting synthetic anticoagulant. According to a report in *Circulation 2*:658 (1950), Paritol prolongs clotting time for eight to twelve hours after an intravenous injection, in contrast to the four or five-hour effect of heparin. In a series of 35 patients treated at the New York Hospital and Cornell University, New York City, repeated doses of the drug were given for periods up to eight days. Occasional toxic effects included further rise of blood urea nitrogen with kidney disease, a severe general reaction with vascular collapse, and swelling of hands and feet. Further trial of Paritol will be carried out before evaluating it.

New Cholecystrographic Medium

Visualization of the gallbladder requires a compound of specific composition which is eliminated in the bile following ingestion. Compounds for this purpose contain iodine which is linked to an organic structure to give radiopacity, ensures prompt absorption, elimination in the bile and subsequent storage in the gallbladder to provide radiographic visualization of this organ. In addition to the property of specificity of gallbladder visualization, a cholecystographic medium should have a low order of systemic toxicity, be radiopaque enough to give adequate visualization with small doses, be non-irritating, be easily administered, and be easily eliminated after use.

Telepaque, 3-(amino-2,4,6-triiodophenyl)-2-ethylpropanoic acid, has been prepared and is being studied for clinical use by Winthrop-Stearns, Inc. It contains 66.68 percent iodine and experimental cholecystograms in animals give a shadow density equal to or greater than that obtained with iodoalphionic acid (Priodax). No side effects were noted and acute toxicity studies in mice indicated that by oral administration Telepaque was only one-third as toxic as iodoalphionic acid. In view of the ease of administration, high iodine content, excellent visualization of the gallbladder, relatively low toxicity and the apparent absence of undesirable side effects obtained with Telepaque, it appears to merit extensive clinical trial as a cholecystographic medium.

TIMELY DRUGS

ACETOXANON . . . is an aqueous suspension of 21-acetoxy pregnenolone, each cc. containing 100 mg. of 21-acetoxy pregnenolone as microcrystals in an aqueous medium containing 4.1 percent glucose, 0.4 per polysorbate 80 and 0.45 percent phenol as a preservative. Acetoxanon, available from Organon Inc., is recommended for the treatment of rheumatoid arthritis. Response consists of reduction in swelling of the joints, relief from pain and increased range of motion. Patients in the younger age group respond most satisfactorily. Dosage initially is 100 mg. of Acetoxanon three times a day given deep into the muscle; this dose is gradually reduced so that during the third or fourth week 100 mg. per day is given, a dose which will usually suffice as maintenance therapy. Re-evaluation of the patient's condition and response to therapy should be made after two months of treatment.

AUREOMYCIN OTIC . . . is Lederle's new form of aureomycin for local application in ear infections. Supplied in a suspension, Aureomycin Otic is useful in the treatment of acute and chronic otitis externa. Two or three drops of the suspension is administered three times daily to the affected ear.

AUREOMYCIN PHARYNGETS . . . a throat lozenge for treating oral infections, has been announced by Lederle Laboratories. The orange-flavored tablets containing 15 mg. of Aureomycin Hydrochloride Crystalline with methylparaben and propylparaben are designed to dissolve slowly in the mouth in treating Gram-negative, Gram-positive and mixed bacterial infections of the mouth and oropharynx. In severe oral infections they may be prescribed in conjunction with systemic Aureomycin therapy.

BRONSYL . . . a new cough syrup available from McNeil Laboratories, is a combination of dihydrocodeinone bitartrate, potassium iodide and racemic desoxyephedrine hydrochloride in a syrup, to which additional narcotics can be readily incorporated.

CER-O-CILLIN . . . is crystalline penicillin O, potassium, having an antibacterial spectrum similar to that of penicillin G. This new preparation offers certain advantages in that it is considerably less allergenic than penicillin G, and is well tolerated by a large majority of patients with a previous history of allergy to penicillin G. Cer-O-Cillin is indicated in penicillin G-sensitive patients in the treatment of the following conditions: Streptococcic, staphylococcic, pneumococcic and gonococcic infections. The preferred method of administration is by muscular intermittent injection. Dosage is the same as for penicillin G and will vary with the type and severity of infection. An initial dose of 50,000 to 100,000 units followed by injections of 30,000 to 50,000 units every three to four hours is recommended. Cer-O-Cillin is available from The Upjohn Company in sterile vials containing 200,000 units.

CILLORAL PENICILLIN WITH TRIPLE SULFONAMIDES . . . is Bristol Laboratories' name for the combination of penicillin with the sulfonamides. It is available in either powder or tablet form. Each teaspoonful or each tablet contains 100,000 units of crystalline potassium penicillin G and 0.17 Gm. of the sulfonamides including sulfadiazine, sulfamerazine and sulfamethazine. This preparation provides a possible synergistic antibacterial action against a wider range of infections than any of the components alone.

Cilloral Buffered Penicillin Powder with Triple Sulfonamides is packaged as a dry powder in a bottle of two fluid ounce capacity. Forty-three cc. of water is added, converting it to a cherry-flavored suspension of penicillin and triple sulfonamides of twelve-teaspoonful doses. Cilloral Penicillin Tablets with Triple Sulfonamides are available in bottles of 50.

CRYSTALLINE VITAMIN A . . . now produced by synthesis on a commercial scale, has been announced by Chas. Pfizer and Co. The new product is now available in a stabilized, high potency dry form, and as a liquid derivative.

Up to this time the commercial synthesis of vitamin A has been very hard to achieve. The crystals were too sensitive to air and humidity for practical use. The crystals are now being coated with gelatin to obtain stability so exceptional that the vitamin shows no substantial deterioration when exposed to air at high temperatures for 1200 hours. This is the approximate equivalent of

storage for three years under normal conditions. This new form of vitamin A makes possible the incorporation into multi-vitamin tablets and the fortification of dry foods.

Dry vitamin A powder is available which has a potency of 500,000 units per gram. The liquid form, which is a yellow color, has a potency of 1,600,000 units per gram and is practically odorless and tasteless.

ESKAPHEN B WITH BELLADONNA . . . is a combination of natural belladonna alkaloids, phenobarbital, and thiamine hydrochloride in elixir form. This preparation, available from Smith, Kline and French Laboratories, is indicated generally in many spastic conditions of smooth muscle. It is of particular value, however, in mucous colitis, dysentery and non-specific ulcerative colitis, peptic ulcer, spastic constipation; in functional derangements causing dyspepsia, post-prandial cramps, and flatulence. It is also highly valuable in pseudo-ulcer syndrome and biliary colic; in cystitis, pyelitis and urethritis; in ureteral spasm and in colic and enuresis in children. Eskaphen B with Belladonna is contraindicated in glaucoma and in individuals sensitive to belladonna or phenobarbital.

GENSALATE SODIUM . . . is a brand of gentisic acid for use in the treatment of rheumatic fever, rheumatoid arthritis, ankylosing spondylitis, fibromyositis and osteoarthritis. Although related to the salicylates, Gensulate Sodium offers the advantage of being almost completely non-toxic. It acts promptly to reduce pain, fever, swelling and other symptoms of rheumatic disease. It is supplied in 0.5 Gm. tablets (uncoated) by The Panray Corporation, New York City. Recommended dosage is two grams every three hours. In prolonged therapy, not more than ten grams daily should be given. In the recommended doses, Gensalate Sodium does not give rise to gastric irritation, deafness, tinnitus, rash, or blood, liver or kidney damage.

MYTINIC TABLETS . . . is an oral hematinic for treating secondary anemias, each sugar-coated tablet containing the essential factors deficient in the hemorrhagic anemias and frequently deficient in the anemias of nutritional origin. In addition to the recognized essentials for adequate hematopoiesis, namely, iron, liver, vitamins C and B complex, each Mytinic tablet provides 5 micrograms of vitamin B_{12}. Mytinic Tablets are supplied by Bristol Laboratories.

PENICILLIN TABLETS WITH TRIPLE SULFONAMIDES . . . are now available from Lederle Laboratories. The combination is for oral use when both penicillin and sulfonamide therapy are indicated in such cases as mild infections produced by streptococci, pneumococci, gonococci and in other infections of mixed etiology. Each tablet contains 100,000 units of crystalline potassium penicillin and 0.167 Gm. each of sulfadiazine, sulfamethazine and sulfamerazine.

PENICOMBISUL . . . in tablet form, is Schering's preparation combining penicillin and sulfonamide therapy. The combination offers certain advantages in that the incidence of toxic reactions is decreased and there is an increase in penicillin titre. It has been shown that with mixed sulfonamides, clinical improvement is more rapid and duration of treatment is often shortened. Penicombisul tablets are indicated in the treatment of infections due to penicillin and sulfonamide susceptible organisms where oral administration is the method of choice. They are especially indicated in mixed infections. Each Penicombisul tablet contains 100,000 units of potassium penicillin G crystalline with 0.166 Gm. of sulfacetimide, 0.166 Gm. of sulfadiazine and 0.166 Gm. of sulfamerazine, a total sulfonamide content of 0.5 Gm.

PROCAINE-EPINEPHRINE SOLUTION . . . for use in spinal anesthesia is available from Abbott Laboratories in three strengths—procaine hydrochloride, 50 mg. (5 percent), with epinephrine, 0.5 mg. (1:2000); procaine hydrochloride, 100 mg. (10 percent), with epinephrine, 0.5 mg. (1:2000); and procaine hydrochloride, 150 mg. (15 percent, with epinephrine, 0.5 mg. (1:2000). This combination has been reported to prolong spinal anesthesia 40 to 60 percent with no evidence of increased toxicity as compared with procaine alone, and no evidence of an increase in undesired side-effects. Procaine-Epinephrine solution is supplied in 1 cc. ampules.

PROFERRIN . . . is a sterile solution of saccharated iron oxide for treating certain conditions of iron deficiency anemia. Proferrin, designed for intravenous administration, provides a prompt hematologic and clinical response, and a low incidence of local and generalized reactions which usually are mild and infrequent, in addition to the fact that almost 100 percent of the iron is utilized. It is supplied in 20 cc. vials and should be administered by slow intravenous injection only, observing certain precautions. It must not be given intramuscularly or subcutaneously. A total dosage of 1 Gm. of iron is recommended, to be given according to a prescribed schedule with an increase in the dose daily. Proferrin is supplied by Sharp & Dohme.

PROMETRON . . . is a combination of estradiol benzoate, 2.5 mg. and crystalline progesterone, 12.5 mg. in 1 cc. of oil solution for intramuscular injection, available from Schering Corporation. Prometron is indicated in the treatment of secondary amenorrhea of short duration due to endo-

crine deficiency. In most cases, uterine bleeding will occur in from three to six days after the last injection. The dosage recommended is 1 cc. intramuscularly, followed the next day by the same dose. The complete treatment is two injections.

PYROMEN . . . is a sterile, nonprotein and non-anaphylactogenic bacterial component prepared in stable colloidal dispersion for intravenous use in the treatment of conditions which respond to fever therapy. It is indicated in allergies such as asthma and hay fever; in iridocyclitis of the eye; in neurosyphilis; and in dermatological cases in which fever therapy is recommended such as neurodermatitis, atopic dermatitis, psoriasis, seborrheic dermatitis, acne, pityriasis rubra pilaris and congenital syphillis.

Dosage depends upon the condition being treated. An initial dose of 0.5 to 3.0 micrograms is usually satisfactory. Subsequent doses may be varied as tolerance and clinical response to the drug require. In the early clinical investigations of Pyromen large doses were used in order to elicit a high fever. Recent research indicates that minimal pyrogenic doses, causing temperature rises of only one degree F. or less, may produce equally good results in many cases. For this reason it is recommended that, even in those disorders heretofore treated with only highly pyrogenic doses, such a minimal febrile response be sought, at least until the degree of benefit may be determined.

If pyrogenic doses of Pyromen are used, a slight degree of discomfort may be encountered. Aside from chills and fever, moderate headache and myalgia may occur, and, occasionally, nausea and vomiting. Aspirin will relieve much of this discomfort. Some patients complain of intermittent, griping pain in the lumbar muscles, lasting 3 to 15 minutes. If this is too distressing, the intravenous injection of 0.25 to 0.5 Gm. of Sodium Amytal will induce relaxation and comfort. Temperature can be reduced to normal by the usual antipyretic measures, if desired.

Pyromen is supplied by Travenol, Inc., Baxter Laboratories, Inc., Morton Grove, Illinois.

Although very large doses of Pyromen have been given over long periods of time with safety, it is advisable not to administer pyrogenic doses in those conditions in which fever is contraindicated.

TOPICILLIN CHEWING TROCHES . . . containing 20,000 units of crystalline penicillin G potassium in a new base of natural and synthetic waxes are available from E. R. Squibb and Sons. They may be used to provide local therapy of infections of the mouth and throat caused by Vincent's organism. The troche is of such a consistency that when chewed, the penicillin content is released slowly, providing a high and continuous concentration of the antibiotic in the saliva. No refrigeration of this product is required.

TRIMETOSE . . . an antihistaminic indicated in the control of coughs due to colds, is available from Schering Corporation. It counteracts allergic manifestations of a beginning cold, acts as a decongestant and expectorant and controls cough through sedation of cough reflex. Trimetose contains in each teaspoonful, Trimeton maleate 7.5 mg.; ammonium chloride 104.8 mg.; sodium citrate 43.0 mg.; and chloroform 17.5 mg. in a palatable, cherry flavored cordial base. Alcohol content is seven percent.

TRUOZINE . . . is Abbott's name for Meth-Dia-Mer-Sulfonamide preparations which are combinations of the three sulfonamides—sulfadiazine, sulfamerazine and sulfamethazine. Truozine is available in three forms including plain tablets, Dulcet tablets, and as a suspension.

VITAMIN A SYNTHETIC MICROCAPS . . . contain vitamin A as the synthetic acetate and palmitate which are not derived from fish liver oils. They are available from E. R. Squibb and Sons in two potencies, equivalent to 25,000 or 50,000 U.S.P. units. They have the advantage of better tolerance since synthetic vitamin A has no fishy odor or after taste. The synthetic form also helps to eliminate the problem of the hypersensitive patient who shows an allergy or idiosyncracy to fish oil-derived vitamin A. In addition, synthetic vitamin A has no vitamin D activity so that larger doses may be used without fear of vitamin D intoxication.

Vitamin A Synthetic Microcaps are indicated in severe vitamin A deficiency, especially in the presence of impaired intestinal absorption; subnormal dark adaptation; xerophthalmia and keratomalacia; skin lesions associated with vitamin A deficiency; diet supplement in diabetes mellitus and other conditions involving dietary restrictions, and in patients with nutritive failure.

The minimum daily requirements of vitamin A for infants, as determined by test for adaptation of dim light, is 25 U.S.P. units per Kg. The minimal daily requirement for adult persons, determined by the same method, is 25 to 50 U.S.P. units per Kg. Somewhat higher amounts are required during pregnancy and lactation.

VITAMIN K ANALOGUE . . . is a sterile solution cantaining 75 mg. of Vitamin K Analogue in 2 cc. ampules. It is indicated primarily for counteracting overdosage phenomena of Dicumarol. If prothrombin activity falls below 15 percent during the course of Dicumarol therapy, or if bleeding occurs, Vitamin K Analogue should be injected slowly intravenously over a period of one minute. Since the effect of this dose becomes apparent only after several hours, transfusion of fresh citrated whole blood of the proper type, or fresh plasma, should also be employed. Vitamin K Analogue is available from The Upjohn Company.

ANSWERS TO QUERIES

Edited by EVLYN GRAY SCOTT, *St. Luke's Hospital, Cleveland*

Hand Lotion

What is the formula for a non-greasy hand lotion?

ANSWER.—The following formula gives a product which is not greasy and washes off with water. It is also convenient to use for the prevention of decubitus ulcer.

Hydrophilic Ointment, U.S.P.	20%
Rose Soluble, or other perfume	1%
Preserved Water, to make	100%

The preserved water may be made by adding 0.04 percent preservative (Methylparaben, U.S.P., 65 parts and Propylparaben, U.S.P., 35 parts) to distilled water.

Preservative for Eserine

Indiana requests a sterilizing agent for eserine salicylate solution for use on an eye tray.

ANSWER.—Since eserine salicylate is incompatible with benzalkonium chloride (Zephiran or Roccal), the following formula is satisfactory if it is possible to use the sulfate form:

Physostigmine Sulfate	2.5 Gm.
Boric Acid	13.0 Gm.
Sodium Bisulfite	1.0 Gm.
Benzalkonium Chloride 1:500, to make	1000.0 cc.

For a comprehensive discussion on eye solutions see the November-December, 1950 issue of THE BULLETIN.

Deodorant

Ohio requests a formula with pine oil and sorbitol for a deodorant and cleanser.

DEODORANT

*Siberene (synthetic pine needle oil)	3000.0 cc.
**Span 60	480.0 Gm.
**Tween 60	700.0 cc.
Ammonium Hydroxide, 28%	900.0 cc.
Water, to make	72,000.0 cc.

Heat together the Span, Tween and approximately two gallons of water until the Span is melted and the mixture is uniformly smooth. Gradually add the Siberene with stirring after each addition. Add approximately three or four gallons of hot water; then add sufficient cold water to make the required amount. Add ammonium hydroxide while adding the cold water. Stir the solution while bottling in bottles or other suitable containers.

NOTE—1. Any of the essential oils may be used according to odor desired. 2. The amount of ammonium hydroxide may be reduced or even omitted if fumes are objectionable.

A small quantity of this solution is added to the soap solution used for cleansing wash bowls, floors, urinals, and other general cleaning. It masks most objectionable odors and leaves a pleasant clean pine odor.

*Siberene may be obtained from Dodge and Olcott, Inc., 180 Varick Street, New York 14, N. Y.

**Span 60 and Tween 60 may be obtained from the Atlas Powder Company, Wilmington 99, Delaware.

Oxygen

Information is requested about the possibility of making oxygen for use in the hospital.

ANSWER.—The Air Products, Inc., Allentown, Pa. has a generator lease plan for manufacturing oxygen. The following is quoted from a letter received from this company: "Our lease plan offers attractive savings to oxygen consumers who use about 150,000 cubic feet or more of oxygen per month."

A general hospital with 450 beds uses about 65,000 cubic feet of oxygen per month. This total amount can easily be figured from the number of cylinders in use—for example, the K. cylinder contains approximately 244 cubic feet.

Buffered Eye Solutions

Where may information on buffered eye solutions be obtained?

ANSWER.—The following articles should be helpful:

1. Hind, H. W. and Goyan, F. M.: A New Concept of the Role of Hydrogen Ion Concentration and Buffer Systems in the Preparation of Ophthalmic Solutions, *J. Am. Pharm. Assoc., Scientific Ed. 36*:53 (Feb.) 1947.

2. Hind, H. W., Goyan, F. M. and Schwarz, T. W.: Notes on the Role of Hydrogen Ion Concentration and Buffer Systems in the Preparation of Ophthalmic Solutions, *J. Am. Pharm. Assoc., Scientific Ed. 36*:413 (Dec.) 1947.

3. Cataline, E. L.: The Preparation of Eye Solutions, *Bull. Amer. Soc. Hosp. Pharm. 7*:264 (Sept.-Oct.) 1950.

If it is not feasible to weigh very small amounts of chemicals to prepare buffer solutions, they may be obtained from the Barnes-Hind Laboratories, 420 Post Street, San Francisco 2, Calif. The solutions which are available include (1) Ophthalmic Buffer Solution No. P-106 for use with salts of pilocarpine, homatropine, eucatropine, scopolamine, atropine and Neo-Synephrine; (2) Ophthalmic Buffer Solution No. E-733 which may be used with salts of eserine (physostigmine) and Ophthalmic Buffer Solution No. Z-346 which may be used with salts of zinc, cocaine, prostigmine, phenacaine, adrenalin, metycaine, pontocaine, optochin, dionin, procaine, nupercaine and syntropan. Eye solutions which are compounded with these solutions are also isotonic. The price is approximately $1.50 per quart. A nasal buffer solution is also obtainable which may be convenient in the preparation of solutions containing salts of ephedrine, Privine and Neo-Synephrine.

Denatured Alcohols

Is there available a listing of the government formulas for specially denatured alcohols?

ANSWER.—Formulas for specially denatured alcohols may be found in *Regulations No. 3* and the *Appendix to Regulations No. 3*, Bureau of Internal Revenue, U. S. Treasury Department, both of which may be obtained from the Superintendent of Documents, Washington, D.C. at a cost of 40c and 10c respectively. A compilation of this material has been made in Lange's *Handbook of Chemistry, Seventh Edition*, under the title "Formulas and Properties of Denatured Alcohols". A representative formula is as follows:

GOVERNMENT FORMULA 23-G

Methylpropyl Ketone	3.5 gal.
Methylisobutyl Ketone	0.5 gal.
Ethyl Alcohol, 190 Proof	100.0 gal.

This formula gives a finished product which at 15.6 degrees C. weighs 6.794 lbs. per gallon and has an apparent proof of 190. The product contains 91.35 percent ethyl alcohol by volume and 87.45 percent ethyl alcohol by weight. This specially denatured alcohol may then be used to prepare a rubbing alcohol as follows:

RUBBING ALCOHOL

Formula 23-G	98.1 fl. oz.
Sucrose Octa-Acetate	0.5 avoir. oz.
Water, to make	1.0 gal.

Alpha-Tocopherols

What is the equivalent in milligrams for one international unit of Alpha-tocopherol?

ANSWER.—One milligram equals one international unit.

Protamine Sulfate

Arizona asks where protamine may be obtained.

ANSWER.—Eli Lilly and Company has a 5 cc. sterile ampul of a one percent solution of protamine sulfate.

Sodium P A B A

Costa Rica asks for a formula for an injectible solution of sodium para-aminobenzoic acid.

ANSWER.—The following is the formula for a sterile solution of sodium PABA:

Para-aminobenzoic Acid	86.0 Gm.
Sodium Bicarbonate	53.0 Gm.
Water for Injection	370.0 cc.

This formula makes 420 cc. of a 24 percent solution.

Choline Salts

Texas asks if there is a syrup or formula that will mask the bitter taste of choline chloride in a concentration of one gram per four cc.

ANSWER.—As far as I know there is no flavor or syrup that will mask choline chloride in this concentration, although the bitartrate or dihydrogen citrate is less bitter at this concentration; however, this would greatly reduce the choline content.

A formula for choline chloride syrup which was taken from a Florida formulary is as follows:

CHOLINE CHLORIDE SYRUP

Choline Chloride	7.5 Gm.
Sodium Benzoate	0.03 Gm.
Amaranth, to color	
Citric Acid	0.2 Gm.
Raspberry Syrup, to make	30.0 cc.

From *The Formulary* of the University of Michigan Hospital the following formula for choline chloride syrup was obtained:

CHOLINE CHLORIDE SYRUP

Choline Chloride	500.0 Gm.
Granulated sugar	3000.0 Gm.
Glycerin	400.0 cc.
F.D. & C. Red, No. 1 Cert.	0.1 Gm.
Benzaldehyde	0.5 cc.
Oil of Lemon, terpeneless	0.5 cc.
Distilled Water, to make	4000.0 cc.

The following formula for choline dihydrogen citrate syrup is being used at St. Luke's Hospital, Cleveland, Ohio:

CHOLINE DIHYDROGEN CITRATE SYRUP

Choline Dihydrogen Citrate	50.0 Gms.
Sarsaparilla Compound syrup	25.0 cc.
Distilled Water, to make	100.0 cc.

The Consolidated Midland Corporation, Katonah, New York has a technical bulletin, No. 24, on choline salts.

CURRENT LITERATURE

Edited by SISTER MARY ETHELDREDA, *St. Mary's Hospital, Brooklyn, N.Y.*

AMERICAN PROFESSIONAL PHARMACIST

DECEMBER, 1950—"Pharmaceutical Activities at the U.S.P.H.S. Hospital," by Ernest J. Simnacher. Describes the ever-necessary vigilence of the pharmacist in maintaining controls to counteract ingenious methods used to divert the use of drugs in a hospital, the main purpose of which is to rehabilitate narcotic addicts. *page 1092*

JANUARY, 1951—"Pharmacy Outpatient Service." Presents the opinion of a hospital pharmacist concerning the desirable programs and types of outpatient pharmacies in special hospital service. Specific suggestions for planning, procedures and policies are given. *page 60*

HOSPITALS

FEBRUARY, 1951—"Opinions." A timely discussion presenting the views of several administrators concerning the use of expensive medications on indigent patients, especially where the reimbursement by government remuneration is not sufficient and the hospital loses large sums due to a deficit. *page 24*

"A Narcotic Control System for Use in the Small Hospital," by Kenneth K. Atkins. Describes in detail the system of control, dispensing, requisitioning and recording of narcotic drugs in a small hospital of 60 bed capacity. *page 95*

HOSPITAL MANAGEMENT

DECEMBER, 1950—"The Story of Cortisone," by Edward C. Kendall, Ph.D. Read at the meeting of the American Pharmaceutical Manufacturers Association in Colorado Springs, Colo., May 30, 1950. Presents the history of development of the product, the early experimental work of clinicians, the pharmacologic action and untoward reactions observed in its use therapeutically. *page 72*

JANUARY, 1951—"Pennsylvania's Pharmacy". This issue is dedicated to the two hundredth anniversary of Pennsylvania Hospital. The pharmacy section describes the development of the hospital pharmacy from 1751 when medicines were supplied by the medical staff to the present situation. *page 86*

PHARMACY INTERNATIONAL

FEBRUARY, 1951—"The Hospital Pharmacist Views Administration," by H. L. Flack. The role of the hospital pharmacist in effecting cooperation between the administration and the pharmacy department is discussed. The fact that the chief pharmacist in the hospital must have administrative ability and be capable of working with other staff members is emphasized. *page 12*

MODERN HOSPITAL

DECEMBER, 1950—"Reader Opinion." An interesting presentation of comment on the article, "Medication Cost Study," which appeared in the September issue of *The Modern Hospital.* Warren W. Irwin, general purchasing agent at University of Rochester, Rochester, Minn., analyzes the results reported on the economy of using disposable injection units and presents interesting controversial opinions. *page 6*

"Historical Aspects of Synthetic Drugs." Describes how the development of studies of structure-activity relationships have made possible the synthesis of new drugs. *page 98*

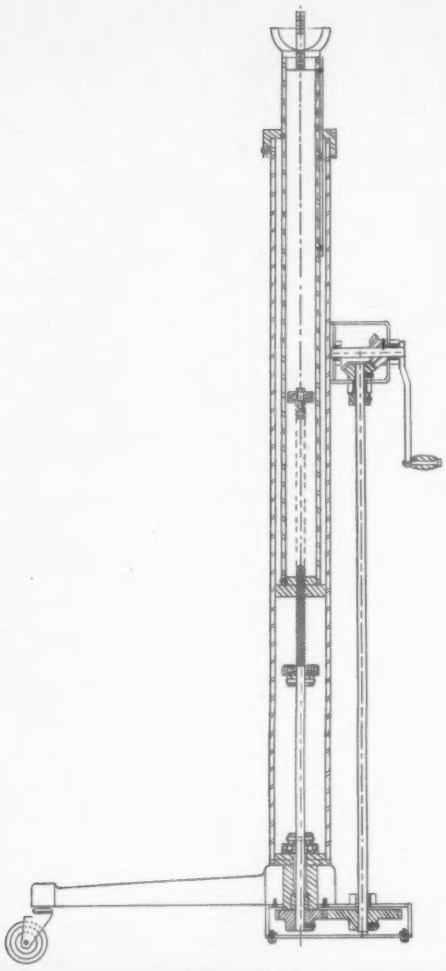
JANUARY, 1951—"Mechanism of Skin Wheal Formation." Describes the anatomical and histological considerations of wheal formation and the chemical agents which produce whealing directly. *page 96*

FEBRUARY, 1951—"Drug Action and Enzymes." An excellent article on the relationship of drugs and enzyme systems. Includes a table of pharmacological agents and the enzyme systems inhibited by them. *page 104*

SOUTHERN HOSPITALS

DECEMBER, 1950—"A Seminar on Hospital Pharmacy." A summary of the program presented by the Louisiana Society of Hospital Pharmacists on November 4 and 5. *page 54*

JANUARY, 1951—"Electrolyte Ion Replacement Therapy," by Dr. Rowland Burns, chief resident, Touro Infirmary, New Orleans. Presented at the seminar held in New Orleans. Dr. Burns describes the methods used to determine the needs of electrolytes to be administered in derangements of the water and electrolytes content of body fluid. *page 56*



PORTABLE ELEVATING MIXER STAND

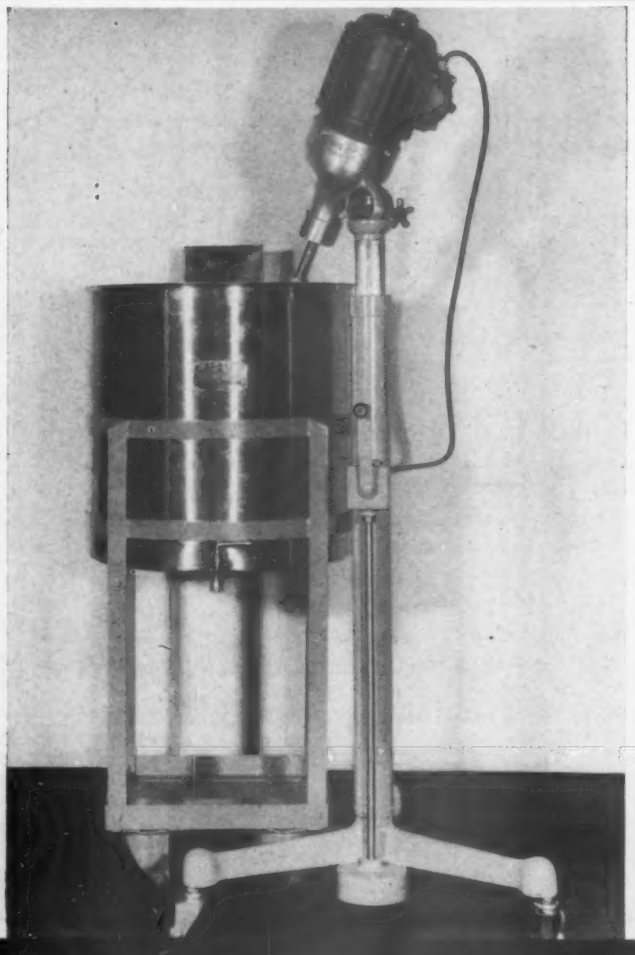
by M. Mordovanecy and Milton W. Skolaut

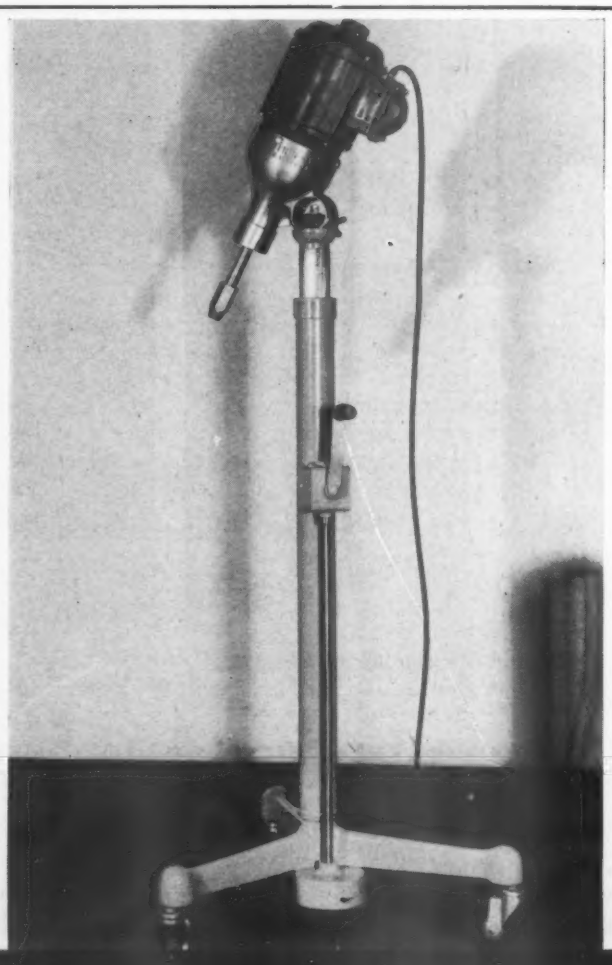
With the advances made in manufacturing procedures for use in the hospital pharmacy, same tools have been introduced which hardly can be called portable, especially where women pharmacists are employed.

The machine shown in the accompanying photographs and diagram is easily and safely movable to any desired position and height. By means of a handle, this mixer may be raised to any desired height, and locking casters will make it stay in any position where it may be placed.

This mixer has proven itself one of the most useful machines in the pharmacy at this hospital.

M. Mordovanecy and Milton W. Skolaut are respectively machinist, Engineering Department and chief, Pharmaceutical Service at the U. S. Public Health Service, U. S. Marine Hospital, Staten Island 4, N. Y.





as the president sees it

I. THOMAS REAMER
Duke Hospital, Durham, N. C.

Educational progress during the past century has been the result of research; men and women in science have done more than their share in an effort to make this world a better place in which to live. When we refer to magazine and newspaper articles and stories reporting the reduced mortality rate of our soldiers, sailors and marines in the Korean war due to the availability of the products of research; namely, penicillin, Aureomycin, Terramycin, Chloromycetin; sulfas, blood products, etc., we are proud that we belong to the health profession.

The spirit of Sir William Osler who told medical students that we are here not to get out of life all that we can for ourselves, but to try and make the lives of others happier is evident today in pharmacy, medicine and nursing.

A recent editorial in *Drug Trade News* reflects our feelings in regard to one of our leading educational institutions.

"The Johns Hopkins University richly deserves the title, 'Mother of Universities', a fact which makes its 75th anniversary of more than passing interest. Certainly medicine, the medical sciences and the drug industry are greatly indebted to this university for much of their progress.

"When the Hopkins was established in 1876 it was, in all basic respects, the only real university in America. There were, of course, many educational institutions known as colleges and universities, but in none of them was research carried on. Scientific investigation played little part in education prior to its advent.

"From the first days, research was the chief motivation of the Hopkins. Soon research scholars trained at the Hopkins began to move into other teaching institutions. Today, more than 2100 of its graduates are teaching in the colleges and universities throughout the country.

Drug Trade News is happy to felicitate the Johns Hopkins University upon its 75th birthday. It has long been a national asset of the first rank."

Research in hospital pharmacy will be stimulated if the worthwhile and encouraging plans of our Committee on Minimum Standards adopt and enforce the Proposed Standard for Pharmacy Internships in Hospitals. Under the heading "Collateral duties and responsibilities of the intern" the committee recommends in part the following:

1. Cooperation in teaching courses to students in the school of nursing and medical intern program.
2. The intern should be encouraged to maintain membership and to participate actively in the functions of pharmaceutical and other professional associations.
3. Clinical and therapeutic conferences conducted in the hospital should be announced and the intern staff encouraged to attend if the subject matter is deemed pertinent.
4. A program of investigation covering some particular pharmaceutical problem should be carried on during each intern service. The project may be selected from any of the activities in the intern program. Under the academic internship, research for credit in the graduate school may take the place of this investigation in the hospital pharmacy.

When these standards are adopted it will be our responsibility to see that our place as a spoke in the wheel of medical progress is made more and more secure.

I Thomas Reamer
President

Graduating Interns in Hospital Pharmacy

Mr. Heller

MR. WILLIAM M. HELLER will complete the academic internship program conducted jointly by the University of Maryland School of Pharmacy, Dr. Noel E. Foss, dean, and The Johns Hopkins Hospital, Dr. W. Arthur Purdum, chief pharmacist, on June 30, 1951. His thesis concerns the replacement of glycerin in barbiturate elixirs by sorbitol. Mr. Heller studied at the University of Indiana and Biarritz American University in France and received his Bachelor of Science in Pharmacy from the University of Toledo. He has had retail experience in Toledo and Baltimore and is a registered pharmacist in the State of Maryland. A native of Ohio, Mr. Heller was born March 15, 1926 and is married. During World War II he served in the 71st Infantry Division in the E.T.O. He is a member of the American Pharmaceutical Association and the American Society of Hospital Pharmacists.

Mr. Keller

MR. CHARLES J. KELLER, one of the three senior interns at the Jefferson Medical College Hospital in Philadelphia, was born in 1926 in West New York, New Jersey. He received his Bachelor of Science degree in Pharmacy from St. John's University, College of Pharmacy in 1949. On completion of graduate study and internship in hospital pharmacy this June, he will receive the Master of Science degree in Pharmacy from the Philadelphia College of Pharmacy and Science. Mr. Keller served in the Pacific with the U. S. Navy Hospital Corps during the war. He is a member of the American Pharmaceutical Association and the American Society of Hospital Pharmacists.

Mr. Presto

MR. JOSEPH F. PRESTO was born in Naugatuck, Connecticut in 1924. He received his Bachelor of Science degree in Pharmacy from Temple University in 1949. Mr. Presto served with a Field Hospital in the Pacific during the war. He is a member of the American Pharmaceutical Association, the American Society of Hospital Pharmacists, and Kappa Psi Fraternity. On completion of his internship in June, 1951, he will receive a certificate of internship from Jefferson Medical College Hospital and the Master of Science degree in Pharmacy from the Philadelphia College of Pharmacy and Science.

Mr. Tester

MR. WILLIAM WAYNE TESTER was born in Duluth, Minnesota in 1924 and attended Duluth Jr. College and Pasadena Jr. College. He obtained his Bachelor of Science degree in Pharmacy from the State University of Montana, in 1949. At the University he was a member of the Student Pharmaceutical Association and Kappa Psi, a Pharmacy fraternity. During the war he served thirty-eight months in the Army paratroops and saw service in the European Theater. A two year internship in Hospital Pharmacy was started at the University of Iowa in the fall of 1949 and is being completed in June of this year. His research project is to study the Fungicidal Activity of Fatty Acids and Fatty Acid Soaps.

Mr. Ketcham

MR. BASIL P. KETCHAM, senior intern at the Jefferson Medical College Hospital of Philadelphia, is a native of Des Moines, Iowa, where he was graduated from Drake University College of Pharmacy in 1949. His experience prior to internship included retail pharmacy, four years Naval service in the Pacific area, and laboratory assistant in pharmacognosy and bacteriology. Mr. Ketcham holds a commission in the Pharmacy Corps of the U. S. Naval Reserve, is a Fellow of the American Association for the Advancement of Science, a member of the American Pharmaceutical Association, the American Society of Hospital Pharmacists, and the Philadelphia Hospital Pharmacists Association. On completion of graduate study and internship in June, 1951, he will receive a Master of Science degree in pharmacy from the Philadelphia College of Pharmacy and Science.

Mr. Parker

MR. PAUL PARKER, a native of Illinois, will receive the Master of Science degree in pharmacy from the University of Michigan in June, 1951, at which time he will have completed the academic internship in hospital pharmacy at the University of Michigan Hospital. Mr. Parker has attended business college, served three years in the Navy Hospital Corps and is 31 years of age. He is a member of the American Pharmaceutical Association, the American Society of Hospital Pharmacists and the Michigan Society of Hospital Pharmacists. He is presently an assistant editor of THE BULLETIN and expects to remain on the staff at the University of Michigan Hospital during the coming year.

Mr. Taniguchi

MR. THEODORE TANIGUCHI will complete his academic internship at the University of Michigan Hospital in June, 1951 and will receive the degree of Master of Science in Pharmacy (Hospital Pharmacy) from the University of Michigan. He was born on July 20, 1928 in Tacoma, Washington, and received his Bachelor of Science degree in Pharmacy from the University of Washington in June, 1949. He is a member of the American Pharmaceutical Association, the American Society of Hospital Pharmacists, and the Michigan Society of Hospital Pharmacists.

Mr. Scofield

MR. MILTON E. SCOFIELD was born in New Haven, Conn. in 1921. He received his Bachelor of Science degree at the University of Connecticut College of Pharmacy, New Haven, in 1942. During the war he served three years in the Army Medical Department and saw service in the European Theater. Mr. Scofield was employed as the pharmacist in the New England Sanitarium and Hospital, Melrose, Massachusetts, from 1946 to 1949. The remaining time up to the fall of 1950 was spent in retail pharmacy. He will receive his M.S. degree this August from the State University of Iowa. He is majoring in Hospital Pharmacy. His research project is on the dispersing of menthol in aqueous preparations for external use. He is a member of the American Pharmaceutical Association and American Society of Hospital Pharmacists.

Miss Wajert

MISS AGNES P. WAJERT was born in New Castle, Pa. in March, 1923. She received her early education in the parochial and public schools of New Castle. While still in high school she began her pharmacy apprenticeship in her father's drug store. Miss Wajert received the Bachelor of Science degree in Pharmacy from the University of Pittsburgh School of Pharmacy in May, 1944. She has had experience as a graduate assistant in pharmacy and chemistry laboratories of her alma mater as well as in retail pharmacy. In June, Miss Wajert expects to receive the Master of Science degree from the University of Maryland School of Pharmacy and a certificate of internship from The Johns Hopkins Hospital. The subject of her thesis is "Chemical Sterilization of Some Ophthalmic Ointments". She is an active member of Lambda Kappa Sigma Sorority, the American Pharmaceutical Association and the American Society of Hospital Pharmacists.

A.S.H.P. AFFILIATES

The MIDWEST ASSOCIATION OF SISTER PHARMACISTS met on January 18 at St. Bernard Hospital in Chicago. Included on the program were films on the use of Demerol and Intracaine and one on Endotracheal Anesthesia presented jointly by Squibb and Winthrop. Plans for a bimonthly publication called the "Adjuvant" were approved by the society as a means of keeping Sister Pharmacists in the Midwest Association informed of activities between regular meetings. Standing committee appointments were made as follows: Sister M. Theodora, O.S.F., Membership and Organization; Sister M. Hortensis, P.H.J.C., Program; and Sister M. Cherubim, O.S.F., Publications.

An informal discussion was held on the dispensing and use of penicillin in the various hospitals. At the next meeting a panel discussion will be held on the different methods employed for requesting, dispensing and charging drugs in hospitals.

Annual reports were presented at the January 17 meeting of the NEW JERSEY SOCIETY OF HOSPITAL PHARMACISTS held at Rutgers College of Pharmacy in Newark. New officers installed are Ludwig R. Pesa, president; Rudolph Wilhelm, vice-president; Bertram F. Jones, treasurer; and Evelyn M. Carlin, secretary. Committee appointments and announcements were made, followed by a film on chronic barbiturate intoxication.

The February 15 meeting of the New Jersey Society was held at Saint Michael's Hospital in Newark. The program included a paper on "First Aid in Civil Defense" by Mr. Bertram Jones.

The GREATER NEW YORK CHAPTER of the American Society of Hospital Pharmacists met at the Foundling Hospital in New York City on December 13. Dr. J. Seifter, Director of Wyeth Institute of Applied Biochemistry presented a talk on Hyaluronidase in which he outlined the historical background and current investigational work. Sister Cecelia Mary, chief pharmacist at the Foundling Hospital was hostess.

Meeting at St. John's Hospital in Long Island City for the January meeting, Sister Miriam Eugene was hostess to the Greater New York Chapter. The speaker, Dr. Mortimer Schohet, presented a lecture on modern treatment of tuberculosis. He reviewed the history of tuberculosis therapy covering the new drugs such as PAS and streptomycin.

Members of the AKRON AREA SOCIETY OF HOSPITAL PHARMACISTS met at Alliance City Hospital in Alliance, Ohio for the January 9 dinner meeting with Mrs. Elnorah Drury as hostess. The role of the pharmacist in an atomic disaster was the subject of a discussion led by Mrs. Mary Morgan. Announcements during the business session included plans for future meetings and arrangements for a joint meeting with the Cleveland Society in April.

The February meeting of the Akron Area Society was held at Peoples Hospital in Akron. Figures on clinic costs in various hospitals were discussed. Mr. William Slabodnick gave a report of the trip to Eli Lilly and Company on January 17, 18 and 19.

The WISCONSIN SOCIETY OF HOSPITAL PHARMACISTS adopted the following resolution in regard to practical experience in hospital pharmacy at the February 16 meeting:

> RESOLVED, that the Wisconsin Society of Hospital Pharmacists desires to have Article 151.02, paragraph 2a, of the Wisconsin Pharmacy Laws amended to read as follows: ". . . the remainder of the five years must be practice and experience in a pharmacy under the direction and supervision of a registered pharmacist . . ." in lieu of the present provision as follows: ". . . the remainder of the five years must be practice and experience in a retail pharmacy or drug store under the direction and supervision of a registered pharmacist . . ."
>
> RESOLVED, that a copy of the foregoing resolution be forwarded to the Wisconsin Pharmaceutical Association to be acted upon at their next meeting.

The meeting was held at Columbia Hospital in Milwaukee with Sister Gladys Robinson as hostess. On the program was Dr. O. H. Stokke who spoke on the place of ACTH and cortisone in therapy. Dr. Stokke, who is the resident physician at Columbia Hospital, outlined the uses of these new preparations, means of evaluating effectiveness, and cited cases which have responded favorably to treatment, as well as contraindications.

Fourteen members and nine guests were present at the January 19 meeting of the Wisconsin Society held at the Milwaukee Children's Hospital. The program included a discussion of "Aminopterin in the Treatment of Leukemia" by Dr. Kenneth Mickle, chief resident of the Milwaukee Children's Hospital.

New members recently accepted in the Wisconsin Society include Sister Wunibalda. St. Mary's Hospital, Wausau; Sister Eusebia Hehli, St. Vincent's Hospital, Green Bay; Sister M.Emmelia, Mercy Hospital, Oshkosh; and Sister M. Franka, St. Joseph Hospital, Marshfield.

The CLEVELAND SOCIETY OF HOSPITAL PHARMACISTS held its January meeting at the MacAllister Laboratories. Included on the program was a movie entitled "Hornpipes"; a discussion of the history of the MacAllister Laboratories by Mr. MacAllister; and a report of the hospital pharmacy section held at the annual meeting of the American Association for the Advancement of Science. Current prices of Cortone and ACTH were discussed.

"Drugs used in Anesthesia" was the subject of a discussion led by Dr. R. J. Whitacre, chief of the Department of Anesthesiology at the Huron Road Hospital in Cleveland, at the February 28 meeting of the Cleveland Society. Drugs discussed by members of Dr. Whitacre's staff included Xylocaine, Surital, Dextran, vasopressor drugs and curare drugs. The program was followed by the business meeting and a discussion of prescription pricing in hospitals.

New officers of the WESTERN PENNSYLVANIA SOCIETY OF HOSPITAL PHARMACISTS were announced at the January 18 meeting held at Falk Clinic in Pittsburgh. Elected president is Sister M. Francine, St. Francis Hospital, Pittsburgh; vice-president, Charles Steffey, Citizens General Hospital, New Kensington; secretary, Josephine Certo, Columbia Hospital, Wilkinsburg; and treasurer, Charles Schmitt, Homestead Hospital, Homestead.

Guest speaker at the February meeting of the Western Pennsylvania Society was Dr. R. J. Englert, Dental Surgeon at the St. Francis Hospital in Pittsburgh. The discussion covered dental problems and preparations of interest to pharmacists, along with slides and illustrations.

Members of the SOUTHERN CALIFORNIA CHAPTER of the American Society of Hospital Pharmacists met at the Good Samaritan Hospital in Los Angeles on January 10. Representatives from the Food and Drug Inspection Service, Los Angeles County Health Department, spoke on their activities and services as well as their relationship to hospital pharmacy. A discussion on "Disaster Preparedness" was led by President Taylor McCain with Mr. Charles Towne and Mr. Walter Hitzelberger participating.

The ILLINOIS CHAPTER of the American Society of Hospital Pharmacists met at the Chicago Hospital Council on January 9. A discussion on "Topical Applications in Dermatology" was presented by Dr. Stephen Rothman, director, Department of Dermatology, the University of Chicago.

New officers of the NORTHERN CALIFORNIA SOCIETY of Hospital Pharmacists installed at the January 9 meeting held at the University of California Hospital include: president, Chase Halladay, Herrick Memorial Hospital, Berkeley; vice-president, Mabel Dolcini, St. Luke's Hospital, San Francisco; secretary, Henry W. Beard, University of California Hospital, San Francisco; and treasurer, Charles Bertrand, French Hospital, San Francisco. Plans for the new year were outlined by President Halladay. Following the business meeting a lecture on "Military Blood Procurement Program" was presented by Mr. W. Max Chapman, director of the Pacific Area, American Red Cross.

Dr. J. A. Katzive, administrator of Mount Zion Hospital in San Francisco was the principal speaker at the February 13 meeting of the Northern California Society. He discussed "Inclusive Rates for Hospitals," pointing out the necessity for standardizing prices for special services such as x-ray, clinical laboratory and pharmacy.

During the business meeting committee appointments were made and plans were outlined for membership activities for the current year by Mr. J. M. Yalon, chairman of the Committee on Membership and Publicity. Also, a change in the Constitution and By-Laws providing for an Auditing Committee instead of a Budget Committee was approved.

Hospital pharmacists in COLORADO are working toward organizing an ASHP chapter. Mr. Samuel Kohan, pharmacist with the Department of Health and Charity in Denver is actively participating in membership activities in that area at the present time.

The FLORIDA ASSOCIATION OF HOSPITAL PHARMACISTS met for a dinner in Miami on January 9. President George Lill, presided over the meeting. A review of the 1950 Edition of the United States Dispensatory, with emphasis on new preparations, was given. Mrs. Anna Thiel, past-president of both the Florida Association and the Southeastern Society of Hospital Pharmacists, announced the forthcoming convention of the Southeastern group and urged Florida members to participate.

International Hospital Federation

The International Hospital Federation is holding the Seventh International Hospital Congress in Brussels, Belgium July 15-21. "The Care of the Chronic Sick and Aged" will be the central theme of the Congress with sectional meetings covering: National and Regional Planning; Planning, Construction, Equipment and Maintenance; Organization, Administration and Finance.

Leonard Goudy to PHS

Mr. Leonard P. Goudy, secretary of the American Hospital Association's Council on Administrative Practice, has been appointed consultant on hospital civilian requirements to the new Civilian Health Requirements Division of the PHS. Hospital pharmacists will remember Mr. Goudy as the coordinator of the Institutes on Hospital Pharmacy during the past few years.

New Members

March 16, 1951

ALABAMA

Ginnatelli, Dora, 8 Kenneth, Mobile

CALIFORNIA

Crichton, Patrick V., 415 Buena Vista Ave., San Francisco
Fein, Meyer, 8604 Rugby Drive, West Hollywood
Fischl, Louis J., 411 - 30th, Oakland (A)
Fries, Edwin R., 797 Bush, San Francisco (A)
Likely, Mary Patricia, 632 Parnassus, San Francisco
Mazzone, Walter F., 3202 Southern, South Gate
Price, John D., 3111 E. Colorado, Pasadena
Sinclair, Isabella N., 736 So. Ave. 60, Los Angeles
Smith, Zita N., 1425 Engracia, Torrance

FLORIDA

Whidden, Dr. Lionel A., 201 E. Winter Park Ave., Orlando

GEORGIA

Taylor, Dr. George W., Milledgeville

INDIANA

Sister M. Rose Seipel, St. Anthony Hospital, Wabash & Ann, Michigan City

IOWA

Bendon, Lucille, Jennie Edmundson Hospital, Oak & Pierce Sts., Council Bluffs
Ladenthin, Harold C., 801 S. Cecelia, Sioux City

KENTUCKY

King, Edmond D., 2616 Hale Ave., Louisville
Newhall, Dr. Bertram A., 2655 Taylorsville, Louisville

MARYLAND

Cooper, Franklin D., 3036 E. Federal, Baltimore

MICHIGAN

Ford, Clarence S., 100 Forest Ave., Ann Arbor
Lemanske, Walter M., 13837 Fairmount, Detroit (A)
Sister M. Dennis Ducey, 1521 Gull Road, Kalamazoo
Sister Mary Agnita, 718 N, Macomb, Monroe
Sogoian, Audrey, 4888 Lonyo Road, Detroit

MINNESOTA

Amberg, Ray, University of Minn., Minneapolis (A)

NEBRASKA

Boye, Arthur J., 2035 South 20th, Lincoln (A)
Harris, Lewis E., Nebraska Theater Bldg., Lincoln (A)

NEW JERSEY

Paoloni, Claude U., 140 Parker Ave., Woodlynne, Audubon
Wilhelm, Rudolph L., St. Michaels Hospital, Newark

NEW YORK

Clark, Jane F., 277 Troup St., Rochester

OHIO

Randall, Martha L., R.F.D. 7, North Canton

PENNSYLVANIA

Beedle, Willa R., 981 E. State, Sharon
Jacobs, Mary R., 614 Oxford St., Harrisburg
Tate, Elizabeth A., 210 W. Sayre

TENNESSEE

Bond, Robert W., C-5 Sterling Court, Nashville

TEXAS

Dial, Charles M., 6716 Covington Lane, Dallas

VIRGINIA

Smith, William A., 2006 Hessian Road, Charlottesville

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*Nesbit and Lapides, University of Michigan Medical Bulletin, Vol. 16, pp. 37-42 (1950); Richardson and Rose, Journal of Urology, Vol. 63, pp. 1113-19 (1950).

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NEWS ITEMS

Briggs Leads Education Foundation

Dr. W. Paul Briggs is now secretary and managing director of the American Foundation for Pharmaceutical Education. He began his work in this position April 2. Dr. Briggs has a long and varied career in pharmacy. Until his new appointment he held the rank of commander in the Navy where he was in charge of all pharmaceutical activities of the Bureau of Medicine and Surgery. He was dean of the School of Pharmacy at George Washington University from 1934 to 1946. From 1946 to 1948 he headed the Pharmacy Division of the Veterans Administration.

Dr. Briggs was graduated from the School of Pharmacy at George Washington University, received his Master of Science degree from the University of Maryland and a Doctor of Science degree from the Philadelphia College of Pharmacy. He was recently awarded the honorary degree of Doctor of Laws by the Temple University College of Pharmacy in recognition of his service in the pharmacy profession.

Having served as vice-president of the American Society of Hospital Pharmacists during 1949-50 and currently as a member of the Committee on Minimum Standards, Dr. Briggs manifests an active interest in hospital pharmacy.

Hansen Receives H. A. K. Whitney Award

Mr. Hans Hansen, administrator at Grant Hospital in Chicago, was presented the H. A. K. Whitney Award by the Michigan Society of Hospital Pharmacists, April 19, at the Ford Hospital in Detroit. Mr. Adam Stark, president of the Michigan Society, presented the award to Mr. Hansen for his outstanding contributions to hospital pharmacy, particularly in developing pharmacist-administrator relationships. Mr. Hansen has been active in hospital pharmacy circles since 1939 when he became chief pharmacist at Grant Hospital.

The award, which is presented annually to an individual who has made outstanding contributions to hospital pharmacy, was established in honor of Mr. Whitney in 1950. Mr. Whitney was probably more instrumental in establishing the American Society of Hospital Pharmacists than any other person and served as the first chairman of this organization. He was formerly chief pharmacist at the University Hospital in Ann Arbor, Michigan and at the present time directs the hospital pharmacy program at Wayne University in Detroit and is chief pharmacist at Receiving Hospital.

The title of Mr. Hansen's lecture at the award presentation meeting was "Work by the Side of Work".

VA Hospitals Fill 3,397,000 Prescriptions

Veterans Administration Hospitals and Centers filled 3,397,000 prescriptions during 1950, according to E. Burns Geiger, chief of VA's Pharmacy Division. Another 1,204,000 prescriptions were filled in VA regional offices and 736,000 by retail pharmacists under the VA "home town" pharmacy program.

Other developments in the VA pharmacy program during 1950 included completion of a Formulary for distribution throughout the Veterans Administration. Also a modern pharmacy was installed in each of the eighteen new hospitals opened in 1950 with one or more pharmacists employed in each hospital.

Dr. Dolezal Dies

Dr. Charles T. Dolezal, M.D., Assistant Director of the American Hospital Association, died March 19 in Chicago. As Secretary of the AHA's Council on Professional Practice, Dr. Dolezal has been active in promoting the Institutes on Hospital Pharmacy and working with the Division of Hospital Pharmacy.

Prior to going with the AHA, he was commissioner and superintendent of City Hospital, Cleveland. He had also served as director of Public Health and Welfare of the City of Cleveland, and as assistant superintendent of City Hospital.

Dr. Dolezal was a graduate of Oberlin College and Western Reserve School of Medicine, where he was at one time instructor in medicine and assistant professor of clinical medicine. He was in private practice of internal medicine in Cleveland for 14 years before entering hospital administration.

A contributor to health and hospital publications, Dr. Dolezal was formerly on the Board of Directors of the Cleveland Academy of Medicine, and trustee of the Cleveland Hospital Council. He was a member of the Ohio and American Hospital Associations, and the Ohio State and American Medical Associations.

Hospital Pharmacist Speaks on Civil Defense

Russell Fiske, chief pharmacist at the University of Virginia Medical College Hospital was a speaker at a Seminar on Civil Defense held in Richmond, March 14 and 15. Following the subject "The Role of the Pharmacist in Civil Defense", Mr. Fiske discussed the organization of hospital services with respect to the part to be undertaken by pharmacists.